



NATIONAL EVALUATION DATA SERVICES

**COST EFFECTIVENESS AND COST BENEFIT  
ANALYSIS OF SUBSTANCE ABUSE TREATMENT:  
AN ANNOTATED BIBLIOGRAPHY**

**June 2002**



The Lewin Group



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**CSAT**  
Center for Substance  
Abuse Treatment  
SAMHSA

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## **FOREWORD**

The Center for Substance Abuse Treatment (CSAT) Office of Evaluation, Scientific Analysis and Synthesis (OESAS) established the original National Evaluation Data Services (NEDS) contract (Contract No. 270-97-7016) in 1997 to support the CSAT mission by increasing evidence-based knowledge of the effectiveness of substance abuse treatment and promoting access to treatment evaluation and analysis data and findings. NEDS furnished that support by supplying data management, scientific analyses, and technical support services.

In 2000, through a new contract (Contract No. 270-00-7078), OESAS both continued and expanded the scope of NEDS in three major areas: treatment data infrastructure, secondary analysis of treatment data including Government Performance and Results Act support, and Web-based treatment data tools for states. NEDS is designed to give the Center the capability to strategically target, acquire, and access existing data from CSAT and other data sources, to generate new treatment information over time through analyses of the available data, and to provide access to this new treatment information to diverse audiences through multiple product lines and avenues. All of these activities are aided throughout by the active participation of a preeminent panel of experts representing diverse constituencies from the field of substance abuse treatment.

This bibliography lists books, published articles and research/evaluation studies, and government documents (including “Web” publications) that focus on the costs of substance abuse treatment, methods for estimating the costs of substance abuse treatment, and studies of the cost effectiveness and cost benefits of substance abuse treatment. A brief discussion of the literature is also provided which attempts to identify trends and areas where there are gaps in the literature for users of this literature, including providers, policymakers and researchers/evaluators. The purpose of this document is to assist professionals within the substance abuse treatment community with their ongoing determination of effective delivery of treatment services.

Patrick J. Coleman  
Project Director  
National Evaluation Data Services (NEDS)

## **ACKNOWLEDGMENTS**

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## ABSTRACT

This bibliography lists books, published articles and research/evaluation studies, and government documents (including “Web” publications) published since 1980 that focus on the costs of substance abuse treatment, methods for estimating the costs of treatment, and studies of the cost effectiveness and cost benefits of substance abuse treatment. This document also identifies trends and areas where there are gaps in the literature. A companion document, *Cost Effectiveness and Cost Benefit Analysis of Substance Abuse Treatment: A Literature Review*, synthesizes the major findings from the reports and studies focusing on the cost effectiveness and cost benefits of substance abuse treatment identified in this bibliography. Both documents are available on the NEDS Web site (<http://neds.calib.com>).

## EXECUTIVE SUMMARY

Cost and economic analysis play an important role in evaluating existing substance abuse treatment programs and in designing new treatment methods. Providers, purchasers and policymakers must evaluate the outcomes and costs of treatment in order to determine how to more efficiently allocate scarce resources to yield the greatest client and social benefits. This annotated bibliography provides a compilation of the evidence-based research that has been published since 1980 on the costs of substance abuse treatment, the methods of estimating costs, and the cost effectiveness and benefits of treatment. This document also identifies trends and areas where there are gaps in the literature.

A broad and comprehensive search of the literature was conducted including a search of nine comprehensive electronic databases and selected government Web sites. Additionally, the reference lists of the acquired documents were manually reviewed to identify further literature. Publications were included in this bibliography if they reported on studies that were “data” based and/or presented cost data. Methodology reports and literature reviews specific to the costs and economics of substance abuse treatment were also included. A total of 154 documents met the inclusion criteria and were included in this bibliography. In order to characterize this literature, information was abstracted from each document across a number of indicators, including the type of cost/economic study, the levels of care, types of treatment cost measures, sociodemographic characteristics of treated population, sources of cost data and the types of outcomes/benefits studied.

The largest number of studies identified were cost benefit studies (n=49), followed by literature reviews (n=31). There have been fewer studies that primarily focus on the cost effectiveness (n=29) or cost of treatment (n=20). The most studied levels/modalities of care are also the most widely used-standard outpatient (n=49), hospital rehabilitation (n=38) and residential rehabilitation (n=36). Cost studies that analyze insurance reimbursements have also been frequently conducted (n=33). The largest number of studies have dealt with “undifferentiated” treatment populations, which include general/adult treatment populations (n=73) and/or populations comprised of abusers of various/multiple types of substances (n=60). The greatest focus has been on alcohol abusing/dependent populations (n=49).

To date, few cost/economic analyses have been completed on treatment for high profile populations such as adolescents, the elderly, women, and cocaine addicts. The criminal justice system and populations with co-occurring illness (mental health and substance abuse) are also areas where fewer studies have been conducted. Moreover, several levels/modalities of care of

increasing policy concern have received minimal cost/economic study, including continuing care, self help, and independent treatment practitioners.

In addition to characterizing the nature of literature available, this bibliography also provides an overview of the data sources used for the study of costs associated with substance abuse treatment. Three cost of treatment estimation methods have been developed and used to various extents in recent years, including (1) estimates of the cost of substance abuse treatment for providers; (2) cost estimates using insurance claims files; and (3) estimates from national census databases. Insurance claims data files and national census databases (e.g., National Survey of Substance Abuse Treatment Unit Survey and the Alcohol and Drugs Services Survey) are available. There has been less standardization in terms of methods, data and data sources for cost effectiveness and cost benefit studies than in cost of treatment studies.

This annotated bibliography serves as a resource for readers interested in obtaining evidence-based information on the costs of substance abuse treatment, the methods for calculating cost estimates and studies of cost effectiveness and cost benefits of treatment. The companion document, *Cost Effectiveness and Cost Benefit Analysis of Substance Abuse Treatment: A Literature Review*, provides a synthesis of the studies and reports compiled in this bibliography.

Cost and cost effectiveness studies are fundamental to the management and delivery of effective substance abuse treatment services. As researchers/evaluators make progress toward identifying treatment approaches that are better or less expensive, or yield improved results at modest increases in cost, both the public and private sector treatment systems will be able to improve their efficiency in delivering effective treatment.



## **I. INTRODUCTION**

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The United States spent about \$11 billion on substance abuse treatment in 1997 (Mark, 2000). This is almost \$40 per resident in our nation. However, a number of studies have concluded that only a fraction of those who could benefit from treatment for alcohol and drug problems get care in a given year (U.S. Department of Health and Human Services, 2000). Clearly, resources for treatment are limited relative to the need, and service providers are continually called upon to provide more effective treatment with limited resources.

Policymakers and third-party payers are increasingly concerned with accountability for resources spent on substance abuse treatment. There are generally believed to be far more medically indigent persons in need of treatment than public funds are available to treat. The onus is put on managers of treatment systems as well as providers to treat more people with limited dollars, and to improve outcomes at the same time. The question that providers, policymakers and payers constantly face is how to use limited resources in order to yield the greatest social benefits. While it is intuitive that any treatment that improves outcomes and reduces costs should be made available, providers, treatment purchasers and policymakers are more often faced with the decision of whether or not to adopt a more costly and more effective treatment than what is currently being offered. Therefore, it is important for these providers, purchasers and policymakers to have evidence-based research to help inform decisions of whether or not an increase in effectiveness justifies an increase in cost of a particular treatment.

Cost and economic analysis play an important role in evaluating existing substance abuse treatment programs and in designing new treatment methods. Evaluating the outcomes and costs of treatment is necessary in order to determine how to more efficiently allocate scarce resources. While a number of studies have been conducted to date that estimate the costs of substance abuse treatment and examine the cost effectiveness and benefits of treatment, there are gaps in the literature. This bibliography provides a compilation of the research that has been published since 1980 on the costs of substance abuse treatment, the methods of estimating costs, and the cost effectiveness and benefits of treatment.

## **1. PURPOSE OF THE BIBLIOGRAPHY**

This bibliography is intended to provide clinicians, researchers/evaluators, and policymakers with a compilation of current evidence-based information on the costs of substance abuse treatment, the methods for estimating the costs of treatment, and studies of the cost effectiveness and cost benefits of substance abuse treatment. Specifically, the goals of this bibliography are to:

- # Provide a comprehensive list of the literature available on this topical area
- # Develop an organizational framework with which to examine the literature

- # Identify higher quality and/or more significant studies
- # Identify trends in the literature in terms of topics studied and areas in need of work.

This document serves as a resource for readers interested in obtaining this much needed information on the costs of substance abuse treatment, the methods for calculating cost estimates and studies of cost effectiveness and cost benefits of treatment. Each of the publications included in this bibliography is characterized across a set of indicators to enable users to readily identify publications that are of interest to them.

## **2. ORGANIZATION OF THE BIBLIOGRAPHY**

This bibliography is organized into an introductory chapter and four remaining chapters. Chapter II describes the approach taken in identifying and selecting relevant literature and data sources on the costs of treatment. Chapter III provides a summary of the number of studies that have been conducted focusing on the costs of treatment, and the cost effectiveness and cost benefits of substance abuse treatment. For each study identified in this bibliography, a set of characteristics has been abstracted to provide the reader with a general overview of the nature, objectives and data characteristics of the study. This chapter identifies the higher quality or significant studies and highlights trends and areas for which there are gaps in the literature. Chapter IV identifies relevant data sources on the cost of treatment by describing the nature and amount of data that exist and have been used in cost studies published since 1980. Chapter V is an annotated bibliography of the current literature on the costs, cost effectiveness, and cost benefits of substance abuse treatment.

## **II. APPROACH**

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This bibliography represents an effort to identify, obtain and characterize studies focusing on the costs of treatment, methods for estimating treatment costs, and the cost effectiveness and cost benefits of treatment that have been published since 1980. The goal has been to: (1) conduct a broad and comprehensive search to identify and acquire as much of this literature as possible in a limited period of time; and (2) summarize the characteristics of each of the relevant studies across a set of indicators to enable practitioners, policymakers and researchers/evaluators to readily identify and access the publications that are of interest to them. This chapter presents key definitions that are central to this document and describes the approach used to select and characterize the publications included in this bibliography.

### **1. DEFINITIONS**

To indicate the intended breadth of the effort being reported, it is necessary to explain the use of four terms, which are central to this document. These are “cost of treatment,” “cost effectiveness,” “cost benefit,” and “cost offset.”

Cost of treatment studies include studies of the expense of delivering substance abuse treatment services by qualified providers as well as the cost of substance abuse treatment services reimbursed by health insurance plans. These are two different types of study, with the first generally constructed from treatment provider data about the services that they deliver and the costs entailed in providing the care. For this bibliography, treatment costs do not include the value of clients’ time spent in treatment. Rather, treatment costs refer to the costs to the provider for delivering substance abuse treatment services. The second type of cost of treatment study examines substance abuse treatment costs paid by insurance providers. Insurance reimbursements are based on coverage amounts and not the “actual” cost of services. This type of data has been frequently used to analyze alcoholism treatment but is more recently being applied to substance abuse treatment.

Cost effectiveness studies are those which are attempting to analyze the relative efficiency of alternative approaches to improving health. These studies create “indices” which relate defined non-monetary “outcomes” to costs for these alternatives. Generally, only a single outcome measure can be accommodated.

Cost benefit studies differ from cost effectiveness studies only in that outcomes are measured using monetary indices. Cost benefit studies can include multiple and different types of outcomes that can be combined since they are each measured using monetary scales. Some

outcomes that are examined in monetary terms in cost benefit studies include crime, victimization, criminal justice expenses, lost work due to illness, and receipt of social welfare benefits.

Cost benefit studies that relate the cost of treatment to subsequent savings in health care expenses are called cost offset studies. This bibliography treats cost offset studies as a variant of cost benefit studies.

## **2. SELECTION AND CHARACTERIZATIONS OF PUBLICATIONS**

A broad and comprehensive search of the literature was conducted to identify and acquire published articles, books and government-published research studies relevant to the goals and objectives of this bibliography. The search was initiated with electronic databases. These were augmented with personal searches of selected government Web sites. Identified abstracts were reviewed for their salience to this topic and appropriate publications and reports were acquired. Finally, the reference lists of the acquired publications and reports were manually reviewed to identify further literature that was not found through the electronic or Web searches.

The objective of this publication was to include all published literature and reports that focused on the costs of substance abuse treatment, the methods for estimating the costs of treatment, and studies of the cost effectiveness and cost benefits of treatment that had material amounts of data (either original, or reviewed and synthesized) on these topics. For this bibliography, substance abuse included alcohol and illicit drugs but did not include tobacco. Abstracts focusing on substance abuse prevention, drug testing and law enforcement per se were excluded since they were outside the scope of this bibliography (although studies about substance abuse treatment in or for law enforcement were included). Publications were included in this bibliography if they reported on studies that were “data” based and/or presented cost data. Thus, letters to editors, commentaries and advocacy pieces, which were not primarily “data” based and did not contain cost data, were not included in this bibliography. In addition, the bibliography identifies methodology reports and literature reviews that are specific to the costs and economics of substance abuse treatment. Excluded are methodology and literature reviews about “health” in general.

The initial electronic search encompassed nine extensive databases including Medline, PsycINFO, Mental Health Abstracts, EMBASE, Sociological Abstracts, TGG Health and Wellness Database, Applied Social Sciences Index and Abstracts, SciSearch and Social SciSearch. Our search was extensive but did not include all the possible electronic databases that

might include literature on economics and health. For example, Econ-Lit, which is a narrow, specialized electronic database used by economists, was not included in this initial search. However, the databases that were searched also cover economics journals, and the subsequent manual search of article reference lists was intended to find further articles relevant to the focus of this bibliography.

The key words used in the search combined terms for substance abuse (substance abuse or dependence, alcohol abuse or dependence, drug abuse or dependence, substance related disorders, alcohol related disorder(s), addiction, or alcoholism) with terms related to costs (cost(s), economic(s), cost-benefit, cost-effectiveness, or cost-effective) and treatment. To be included in this bibliography, the search terms had to appear in either the title, the abstract, or the descriptor field of the abstract. The search was limited to English language articles and books published since 1980 which dealt with substance abuse treatment services provided in the United States. The search results produced approximately 1,200 unduplicated abstracts. Accordingly, the substantial and growing general methodological literature about cost effectiveness and cost benefit analysis were not included. The scope and nature of the general methodological literature were beyond our objectives or resources to assess and characterize.

Each abstract was reviewed by two different reviewers to identify studies that were within the scope and objectives of this bibliography. Of the 1,200 abstracts reviewed, 356 met the inclusion criteria and were deemed potentially relevant. We found that a large number of publications made reference to “cost(s)” in their abstracts but when we reviewed the publication, costs were not a primary or secondary focus of the publication and therefore were not included in the bibliography. We then obtained copies of the relevant articles and books. We checked these citations against a previous bibliography (Caliber Associates, 1999) also on this general topic. Virtually all of the nearly 100 studies in the prior bibliography had been identified through the electronic search and another 250 potential citations were found through the broad electronic search after screening.

Finally, we conducted a search of Web sites hosted by the Center for Substance Abuse Treatment, the National Institute on Alcohol Abuse and Alcoholism (NIAAA) and the National Institute on Drug Abuse (NIDA) to identify additional government publications and reports relevant to the topic of this bibliography. We reviewed all of the articles, books and research studies and found that of the 356 documents, 146 met the inclusion criteria. A final attempt to identify relevant literature was a search of the literature cited in the final list of studies. This step identified an additional eight publications that were relevant to this bibliography. The final number of documents included in this bibliography was 154.

In order to characterize this literature (topics with more and less work performed to date), we abstracted information from each study across a number of indicators. The type of information that was abstracted from each document included:

- # Type of cost/economic study
- # Levels/modalities of care analyzed
- # Types of treatment cost measures developed and used
- # Type of substance problem studied
- # Sociodemographic characteristics of the treated population
- # Sources of the cost data
- # Types of outcomes/benefits studied.

For the articles and books we were unable to acquire due to limited time and resources, we characterized the studies based on the information in the electronic abstracts. Two different reviewers reviewed each publication and abstracted the study information. A third reviewer then checked all the articles and corresponding data abstraction to ensure inter-rater consistency among the different reviewers.

The information abstracted for each document is summarized in a matrix in the following section. The matrix enables a specific segment of the literature to be identified rapidly, and the complete bibliographic citation allows this literature to be acquired. This will allow the interested reader to identify studies of a general type or with a particular focus. This should be particularly useful because even though the literature search and abstraction process identified a narrow and specific literature (cost/economic analysis of substance abuse treatment), there is a high level of variation in the types of studies as well as the focus of the analyses. It is the narrowly defined segments of the literature that will likely be of interest to providers, policymakers and researchers/evaluators.

While we highlight some publications that are good examples of higher quality studies, it was beyond the scope of this document to rate the quality of each study. Nearly all of the publications included in this bibliography were publications in peer-reviewed journals, which are considered to be more rigorous studies and of higher quality than publications in non peer-reviewed journals. However, since the goal of this bibliography was to be as comprehensive as possible, we also included books, dissertations and reports published on government Web sites that were relevant to the focus of this bibliography.



### **III. OVERVIEW OF THE LITERATURE**

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This effort identified 154 studies focused primarily on the cost and economics of substance abuse treatment, which have been published in the peer-review literature; by the Center for Substance Abuse Treatment (CSAT), National Institute on Drug Abuse (NIDA) or National Institute on Alcohol Abuse and Alcoholism (NIAAA); or posted on the Web sites of these agencies. This is a highly diverse literature that has been continually evolving since the 1970s. There have been major advances made in terms of the economic theory, data availability and estimation methodology in the past 10 years. The greatest proportion of the literature that has been identified has been produced since 1995. While this bibliography includes publications and reports since 1980, the most recent findings and data are highlighted. This chapter provides a discussion of the trends and gaps in the literature.

#### 1. TRENDS IN THE LITERATURE

To provide the reader with a sense of the breadth and depth of the literature represented in this bibliography, the studies are classified and tallied in several tables below. Exhibit III-1 shows that the largest number have been cost benefit studies, followed by literature reviews. There have been fewer studies that primarily focus on cost effectiveness or cost of treatment. There have been 21 reports that are primarily formulations of new or improved methodologies for performing cost of treatment, cost benefit or cost effectiveness studies. Another four studies have been classified as “simulations,” or studies in which the author(s) developed a model and used data drawn from other studies to generate conclusions about the cost effectiveness of substance abuse treatment.

<b>EXHIBIT III-1</b>	
<b>CITATIONS BY PRIMARY TYPE OF STUDY</b>	
<b>Type of Study</b>	<b># of Citations</b>
Cost of treatment	20
Cost benefit	49
Cost effectiveness	29
Literature review	31
Methodology report	21
Simulation	4

Another useful way to examine this literature is by the levels/modalities of care that have been studied (see Exhibit III-2). Perhaps not surprisingly, the most studied levels of care are also

the most widely used: standard outpatient, hospital rehabilitation and residential rehabilitation. Outpatient opioid substitution therapy (predominantly methadone maintenance) has also been studied in a number of cost/economic analyses. Another frequent type of cost study looks at treatment of any/all types covered by health insurance. This type of study analyzes reimbursement patterns using health insurance claims files. Fewer studies have examined care using medications (other than opioid substitutions), independent practitioners and continuing care (sometimes referred to as “aftercare”).

<b>EXHIBIT III-2</b> <b>CITATIONS BY TYPE OF TREATMENT MODALITY STUDIED</b>	
<b>Level/Modality of Care</b>	<b># of Citations</b>
Hospital inpatient detoxification	12
Hospital inpatient rehabilitation	38
Residential detoxification	5
Residential rehabilitation	36
Outpatient detoxification	9
Intensive outpatient (“or day”)	22
Standard outpatient	49
Outpatient opiate substitution (methadone, LAAM, buprenorphine)	30
Other medication	3
Independent practitioner	4
Specified adjunct component (e.g., family, mental health)	22
Self help (AA, CA, NA)	7
Continuing care/aftercare	4
Insurance reimbursements	33

Another focus of significant interest is the nature of the population and the type of substance used by the clients being studied, as presented in Exhibit III-3. The largest number of studies dealt with “undifferentiated” treatment populations, which included general/adult treatment populations and/or populations comprised of abusers of various/multiple types of substances. The greatest focus was on alcohol populations—about one-third of studies (excluding

literature reviews and methodological works) analyzed treatment for alcohol dependence/abuse. Only four cost/economic studies had a primary focus on cocaine dependence/abuse, while 13 had a primary focus on opiate abusers (recall that 30 studies looked at opioid substitution therapy, although generally this was part of a study of multiple types of care). Few studies have had a primary focus examining the costs/economics of treating distinct socio-demographic populations such as women, teens or prisoners.

<b>EXHIBIT III-3</b> <b>TYPE OF SUBSTANCE AND CHARACTERISTICS OF STUDY POPULATION</b>	
<b>Population Studied</b>	<b># of Citations</b>
Polysubstance/unspecified or various	60
Alcohol	49
Opiates	13
Cocaine	4
General/adult clients	73
Co-occurring mental illness and substance abuse	8
Females	7
Teens	2
Medicare	2
Medicaid	5
Veterans	8
Prisoners	7
Workers	3

To assist users of this bibliography to identify publications that are of specific interest to them, each study has been coded across a set of indicators, including the study design, the level/modality of care studied, types of cost estimates calculated, and the client population examined (see Exhibit III-4 for coding scheme). The documents presented in Exhibit III-5 were sorted by study type, and then within study type, by alphabetical order of the first author.

<b>EXHIBIT III-4</b> <b>KEY TO ABSTRACTION AND CODING OF THE LITERATURE</b>	
<b>Study Characteristic</b>	<b>Key to Coding of Characteristic</b>
Type of study	Primary focus of study; some studies have multiple foci and the primary focus is listed first, followed by the other study types C: Cost of treatment CE: Cost effectiveness CB: Cost benefit (includes cost offset studies) M: Methodology report L: Literature review S: Simulation (model created based on available data)
Primary focus on cost/economics	An "x" is indicated if cost/economics is the primary or at least a material focus of the study
Study design/comparison population (only if cost-effectiveness, cost-benefit)	1: Non-randomized pre-post single type of care/population 2: Non-equivalent populations (same level of care, different approaches) 3: Non-equivalent populations (different levels of care) 4: Non-equivalent populations (treated versus untreated) 5: Random assignment A blank indicates that the information was either not applicable to the study type (methodology or literature reviews) or this information was not provided in the document.
Level(s)/modality of care studied	An "x" is indicated for each of the following types/levels of care examined in the study Hospital inpatient detoxification Hospital inpatient rehabilitation Residential detoxification Residential rehabilitation Outpatient detoxification Intensive outpatient ("or day") Standard outpatient Outpatient opiate substitution (methadone, LAAM, buprenorphine) Other medication Independent practitioner Specified adjunct component (e.g., family, mental health) Self help (AA, CA, NA) Continuing care/aftercare Insurance reimbursements: services covered under insurance, generally includes a range of the above levels/modalities of care
Type of cost data/estimates	An "x" is indicated for each of the following types of cost data/estimates in the study Episode-completed Episode-average Day of care (for inpatient)/"slot costs" Week/day enrolled (for ambulatory) Encounter/visit (for ambulatory) Specified units of service (for inpatient or ambulatory) Covered reimbursements: data from insurance claims or provider data on client

<b>EXHIBIT III-4 (CONT.)</b> <b>KEY TO ABSTRACTION AND CODING OF THE LITERATURE</b>	
<b>Study Characteristic</b>	<b>Key to Coding of Characteristic</b>
Focus on clients: Type of Drug Studied	P: Polysubstance clients (includes clients with unspecified or multiple problems) A: Alcohol dependent/abusing clients O: Opiate dependent/abusing clients C: Cocaine dependent/abusing clients
Demographic Characteristics of Study Population	x: Indicates Co-occurring (substance abuse and mental health)
	G: General (not specified as any of the following) M/F: Males or females, respectively T: Teenage/adolescents (under 18 years) A: Adults (18 to 64 years) E: Elders (65 years and over) R: Race/ethnic group a particular focus P: Prisoners treated while incarcerated V: Veterans served by Veteran's Administration facilities W: Workers served under workplace insurance MC: Medicare insured population MA: Medicaid insured population

**EXHIBIT III-5**  
**DESCRIPTION OF STUDY BY TYPE OF ANALYSIS, TREATMENTS,**  
**MEASUREMENTS, AND CLIENTS**

Study			Level/Modality of Care														Type of Cost Estimate							Clients			
First Author (Year)	Type of Study	Cost Primary Focus	Study Design/Comparison Population	Hosp. Inpt. Detox.	Hosp. Inpt. Rehab.	Resid. Detox.	Resid. Rehab	Outpt. Detox.	Intensive Outpt (or "day")	Standard Outpt.	Outpt. Opiate Substitution	Other Medication	Independent Practitioner	Specified Adjunct Component	Self Help (e.g., AA, CA, NA)	Continuing Care (incl. Aftercare)	Ins. Reimbursements	Episode - Completed	Episode - Average	Day of Care (24 hrs./ "Slot Cost")	Week/Day Enrolled (Ambulatory)	Encounter/Visit (Ambulatory)	Specified Units of Service	Covered Reimbursements	Poly or Single Substance	Comorbid SA/MH	Demographic
Anderson (1998)	M,C	x					x			x									x	x			x		P		G
Bradley (1994)	M,C	x									x								x	x					O		G
CCC (1998)	M,C	x																									
Fox (1995)	M,C	x	3														x							x	P		MA
French (1995) <sup>1</sup>	M,CB	x																									
French (1996) <sup>1*</sup>	M, CE	x																									
French (1997) <sup>1</sup>	M,C	x					x			x	x								x	x					P		G
French (1997) <sup>2</sup>	M,C	x								x	x								x	x					P		G
Garnick (1996)	M, C	x															x							x	P		G
Gold (1996)	M,CE																										
Harwood (1999)	M,CE,CB	x																									
Hser (1991)	M,CE,CB	x																									
Hubbard (1991)	M,CE,CB	x																									
Richman (1983)	M,CE	x																									
Rydell (1994)	M,CE						x			x									x	x					C		
Salome (2001)	M, C	x		x	x	x	x		x	x	x								x		x				P		G
Sheffet (1982)	M,CB	x	3				x			x	x								x	x	x				O		G
Sindelar (1997)	M,CE,CB	x																							P		
Wing (1990)	M, CE,CB	x																							A		G
Yates (1999)	M,CE,CB	x																									
Zarkin (1994)	M,CE,CB	x																									
Alterman (2001)	L,CB																										
Annis (1986)	L,CE	x		x	x			x	x																A		G
Apsler (1991) <sup>1</sup>	L,CE	x																									
Apsler (1991) <sup>2</sup>	L,CE	x																									
Barnett (2000)	L,CE	x									x														O		
Beshai (1990)	L,CE			x				x								x									A		
Borkman (1998)	L, CE						x																				
Cartwright (1998)	L,CB,CE	x																									
Cartwright (2000)	L,CB	x																									
Finney (1996)	L,CE	x																							A		
Fletcher (1999)	L,CB																										
French (1995) <sup>2</sup>	L,CB	x																									
French (1996) <sup>2</sup>	L,CB	x																									
French (2000) <sup>1</sup>	L,CE,CB	x																							A		
French (2001)	L,CE,CB	x			x				x	x															A		

**EXHIBIT III-5 (CONT.)**  
**DESCRIPTION OF STUDY BY TYPE OF ANALYSIS, TREATMENTS,**  
**MEASUREMENTS, AND CLIENTS**

Study				Level/Modality of Care														Type of Cost Estimate						Clients			
First Author (Year)	Type of Study	Cost Primary Focus	Study Design/Comparison Population	Hosp. Inpt. Detox.	Hosp. Inpt. Rehab.	Resid. Detox.	Resid. Rehab	Outpt. Detox.	Intensive Outpt (or "day")	Standard Outpt.	Outpt. Opiate Substitution	Other Medication	Independent Practitioner	Specified Adjunct Component	Self Help (e.g., AA, CA, NA)	Continuing Care (incl. Aftercare)	Ins. Reimbursements	Episode - Completed	Episode - Average	Day of Care (24 hrs./ "Slot Cost")	Week/Day Enrolled (Ambulatory)	Encounter/Visit (Ambulatory)	Specified Units of Service	Covered Reimbursements	Poly or Single Substance	Comorbidity SA/MH	Demographic
Holder (1987) <sup>1</sup>	L,CB	x																							A		
Holder (1991) <sup>2</sup>	L,CB	x			x		x			x							x		x					x	A		
Holder (1992) <sup>2</sup>	L,CB	x																							A		
Holder (1992) <sup>3</sup>	L,CB	x																							A		
Holder (1998)	L,CB	x																							A		
Howard (1990)	L,CE																								A		
Lennox (1992)	L,CE	x												x													
Leukefeld (1998)	L,CE	x																									P
Merrill (1999)	L,CE,CB	x																									
Miller (1998)	L,CE																										
Peele (1990)	L,CE	x																							A		
Rutgers Univ (1993)	L,CE,CB	x																									
Saxe (1983)	L,CB,CE	x																							A		
USDHHS (2000)	L,CE,CB																										
Wexler (1996)*	L,M	x																									P
Wing (1991)	L,CB,CE	x																							A		
Cartwright (1993)	C	x															x			x				x	P	x	MC
Cisler (1998)	C	x								x			x		x					x				x	A		G
Dayhoff (1994)	C	x		x	x	x	x	x	x	x	x	x		x		x				x					P		G
French (1994)	C	x	2								x			x						x					O		G
French (2000) <sup>2</sup>	C	x																					x				
Friedman (1993)	C	x							x											x					P	x	A
Goodman (1991)	C	x	1		x					x							x			x	x	x		x	A		G
Goodman (1992)	C	x	1		x					x							x			x	x	x		x	A		G
Goodman (1996)	C	x	1		x					x							x			x	x	x		x	A		G
Goodman (1997)	C	x	1		x					x							x			x	x	x		x	P		G
Goodman (1998)	C	x	1		x					x							x			x	x	x		x	P		A
Harwood (2001a) <sup>1</sup>	C	x		x	x		x	x	x	x									x	x	x		x		P		G
Harwood (2001b) <sup>2</sup>	C	x				x													x		x		x		P		F
Holder (1991) <sup>1</sup>	C	x	1														x							x	A		G
Rosenbach (1994)	C	x		x	x		x	x	x	x				x			x			x				x	P		MA,F
Schoenbaum (1998)	C	x	3														x		x	x	x	x		x	P		G
Siegel (1984)	C	x			x					x															A	x	G
Sturm (2001)	C	x															x							x	A		G
Walsh (1991)	C		5		x										x				x						A		W



**EXHIBIT III-5 (CONT.)**  
**DESCRIPTION OF STUDY BY TYPE OF ANALYSIS, TREATMENTS,**  
**MEASUREMENTS, AND CLIENTS**

Study				Level/Modality of Care														Type of Cost Estimate						Clients				
First Author (Year)	Type of Study	Cost Primary Focus	Study Design/Comparison Population	Hosp. Inpt. Detox.	Hosp. Inpt. Rehab.	Resil. Detox.	Resil. Rehab	Outpt. Detox.	Intensive Outpt (or "day")	Standard Outpt.	Outpt. Opiate Substitution	Other Medication	Independent Practitioner	Specified Adjunct Component	Self Help (e.g., AA, CA, NA)	Continuing Care (incl. Aftercare)	Ins. Reimbursements	Episode - Completed	Episode - Average	Day of Care (24 hrs./ "Slot Cost")	Week/Day Enrolled (Ambulatory)	Encounter/Visit (Ambulatory)	Specified Units of Service	Covered Reimbursements	Poly or Single Substance	Comorbid SA/MH	Demographic	
Westermeyer (1998)	C	x		x	x	x	x	x		x	x	x								x						P	x	G
Alfano (1987)	CB	x	1		x														x							A		V
Anglin (1989)	CB		4								x						x			x						O		G
Berkowitz (1996)	CB		1				x													x						P		F,P
Blose (1991)	CB	x	1		x		x			x							x			x				x		A		G
Booth (1997)	CB	x	3	x	x				x	x					x					x			x			A		M,V
Daley (2000)	CB	x	1			x	x	x			x								x	x	x					P		F
DeHart (1993)*	CB	x																								A		A
Flynn (1999)	CB	x	1				x			x									x		x					C		G
French (1991)	CB	x	2				x			x	x											x				P		G
French (1992)*	CB	x	2				x				x															P		G
French (2000) <sup>3</sup>	CB	x	3				x		x								x		x							P		G
Gerson (2001)	CB	x	4	x	x					x							x		x	x				x		P		MA
Gerstein (1994)	CB	x	1				x	x		x	x								x	x	x					P		G
Goodman (2000)	CB	x	1		x					x							x			x	x	x		x		A		M
Hartz (1999)	CB	x	5								x									x						O		A
Harwood (1988)	CB	x	3				x			x	x								x	x	x					P		G
Harwood (1998)*	CB	x	1				x			x	x								x	x	x					P		F
Harwood (2000)	CB	x	1		x		x		x	x		x							x							P		G
Holder (1981)*	CB	x	1														x							x		A		G
Holder (1986) <sup>1</sup>	CB	x	1														x							x		A		G
Holder (1986) <sup>2</sup>	CB	x	1														x							x		A		G
Holder (1987) <sup>2</sup>	CB	x	1														x							x		A		G
Holder (1992) <sup>1</sup>	CB	x	1														x							x		A		G
Holder (2000)	CB	x	5							x					x		x		x		x	x		x		A		G
Hughey (1996)	CB		4						x										x							P		P
Humphreys (1996)	CB	x	3							x						x			x							A		G
Humphreys (2001)	CB	x	2		x										x	x			x							P		V
Jerrell (1996)	CB	x	5												x	x							x			P	x	G
Kashner (1992)	CB	x	5		x												x		x					x		A		V
Koenig (1999)	CB	x	1				x		x	x	x								x	x	x					P		G
Koenig (2000a) <sup>1</sup>	CB	x	1				x			x									x	x	x					P		G
Koenig (2000b) <sup>2</sup>	CB	x	1				x			x									x	x	x					P		G
Lee (1998)*	CB	x	2						x						x									x		P	x	G
Lennox (1993)	CB	x	1														x							x		A	x	G
Lessard (1985)	CB	x	1		x														x							A		G

**EXHIBIT III-5 (CONT.)**  
**DESCRIPTION OF STUDY BY TYPE OF ANALYSIS, TREATMENTS,**  
**MEASUREMENTS, AND CLIENTS**

Study			Level/Modality of Care												Type of Cost Estimate						Clients						
First Author (Year)	Type of Study	Cost Primary Focus	Study Design/Comparison Population	Hosp. Inpt. Detox.	Hosp. Inpt. Rehab.	Resid. Detox.	Resid. Rehab.	Outpt. Detox.	Intensive Outpt (or "day")	Standard Outpt.	Outpt. Opiate Substitution	Other Medication	Independent Practitioner	Specified Adjunct Component	Self Help (e.g., AA, CA, NA)	Continuing Care (incl Aftercare)	Ins. Reimbursements	Episode - Completed	Episode - Average	Day of Care (24 hrs./ "Slot Cost")	Week/Day Enrolled (Ambulatory)	Encounter/Visit (Ambulatory)	Specified Units of Service	Covered Reimbursements	Poly or Single Substance	Comorbid SA/MH	Demographic
Lo (1993)	CB	x	3	x	x			x		x							x							x	A		L,M
Maddox (1996)*	CB		1											x					x						P		P
Mauser (1994)	CB	x	1	x	x		x			x				x				x		x					P		G
McGlothlin (1981)	CB	x	1								x									x					P		G
Mecca (1997)	CB	x	1				x			x	x														P		G
O'Farrell (1996) <sup>1</sup>	CB,CE	x	5										x	x					x			x	x		A		M
O'Farrell (1996) <sup>2*</sup>	CB,CE	x	5										x	x					x			x	x		P		G
Rajkumar (1997)*	CB	x	1																						P		G
Reutzel (1987)	CB	x	1														x			x				x	A		MA
Schoenwald (1996)	CB	x	5							x									x	x			x		P		T,P
Svikis (1997)	CB	x	4				x		x					x					x	x					P		F
Womer (1993)	CB	x	2														x			x				x	P		W
Yu (1991)	CB	x	2														x			x				x	P		W
Zywiak (1999)	CB	x	1		x				x	x								x	x	x					P		G
Alterman (1994)	CE	x	5		x				x							x				x	x				C		V
Avants (1999)	CE	x	5								x			x				x			x				O		G
Bachman (1992)	CE		5		x				x										x						P		G
Barker (1999)	CE		4		x									x			x							x	P		G
Barnett (1997)	CE	x	2		x														x	x					P		V
Bickman (1996)*	CE	x												x											P		G
Brent (1998)*	CE, CB	x																							A		G
Bury-Maynard (1999)*	CE	x																							P		G
Daley (2001)	CE	x	3			x	x	x		x	x						x		x	x	x				P		MA,F
Deschenes (1991)	CE	x	1								x									x					O		M,R
Fals-Stewart (1997)	CE,CB	x	5							x				x					x				x		P		MA
Fink (1985)	CE		5		x				x										x						A		G
Freeborn (1991)	CE	x					x		x					x			x			x				x	P		T
French (1999)	CE	x	2				x													x				x	P	x	G
Griffith (2000)*	CE	x	4				x											x							P		P
Hayashida (1989)	CE		5	x					x										x						A		M,V
Kraft (1997)	CE	x	5								x			x					x	x				x	O		G
Longabaugh (1983)	CE	x	5		x				x										x						A		G
Lu (1998)*	CE	x								x															P		G
Machado (2001)	CE	x								x									x			x			P		G
McCready (1986)	CE		5		x				x										x	x					A		G

**EXHIBIT III-5 (CONT.)**  
**DESCRIPTION OF STUDY BY TYPE OF ANALYSIS, TREATMENTS,**  
**MEASUREMENTS, AND CLIENTS**

Study			Level/Modality of Care														Type of Cost Estimate					Clients						
First Author (Year)	Type of Study	Cost Primary Focus	Study Design/Comparison Population	Hosp. Inpt. Detox.	Hosp. Inpt. Rehab.	Resil. Detox.	Resil. Rehab	Outpt. Detox.	Intensive Outpt (or "day")	Standard Outpt.	Outpt. Opiate Substitution	Other Medication	Independent Practitioner	Specified Adjunct Component	Self Help (e.g., AA, CA, NA)	Continuing Care (incl. Aftercare)	Ins. Reimbursements	Episode - Completed	Episode - Average	Day of Care (24 hrs./ "Slot Cost")	Week/Day Enrolled (Ambulatory)	Encounter/Visit (Ambulatory)	Specified Units of Service	Covered Reimbursements	Poly or Single Substance	Comorbid SA/MH	Demographic	
Miller (1980)	CE		5										x										x		A		G	
Pettinati (1999)	CE	x	3		x					x				x	x				x							A		G
Reiff (1981)	CE	x	1		x					x							x							x	A		G	
Schinka (1998)	CE	x	5		x		x												x						P		V	
Schneider (1996)	CE		5				x		x						x			x	x	x					C		G	
Shepard (1997)*	CE	x	1				x			x									x						P		G	
Vaughn (1998)*	CE	x	5		x					x				x											P		G	
Weisner (2000)	CE	x	5						x	x									x						P		G	
Barnett (1999)	S,CE	x									x								x						O			
Barnett (2001)	S,CE	x	2								x														O			
Rosenheck (2001)	S,CE	x	2								x											x	x		O		G	
Zaric (2000)	S,CE	x									x														O		G	

\* = Could not locate publication. Coding based on electronic abstract.

1,2,3 = For studies published by the same first author in the same year, the superscript number corresponds to the order in which it appears in the annotated bibliography.

Exhibit III-5 can be used by readers in several ways. First, using the matrix, readers can easily identify specific publications that are of interest to them by topic area. For example, clinicians may be primarily interested in finding data about the cost of treatment when they are engaged in negotiating reimbursement rates in treatment contracts and would search for cost of treatment studies under the "type of study" column. Providers will most likely be interested in cost data about particular types of care; thus we have coded which reports have data about which levels/modalities of care. To further facilitate use of the reports for users, more detail has been provided about the kind of cost data that a study contains. Many studies have cost estimates for a treatment episode, while only a few have data about the costs of specific units of service (e.g., intake assessment, individual and group therapy sessions, case management).

Exhibit III-5 should be of particular interest to researchers/evaluators. An examination of the type of information coded reveals differences among study designs that would be expected to have major impacts on their results. For example, out of the nearly 50 cost benefit studies, about 20 assess treatment benefits in terms of changes in health care expenditures. These 20 studies primarily analyze whether substance abuse treatment pays for itself when included in a health insurance benefit. Another issue that may be of interest to researchers/evaluators is the application of outcome methods from the general health literature. We have identified six cost effectiveness (and simulation) studies that use quality- or disability-adjusted life years (QALY and DALY) as their outcome metric. This methodology has become widely applied in the general health assessment literature, and these six reports will give researchers/evaluators insight into adoption of this cutting-edge outcome methodology for assessment of substance abuse treatment.

## **2. GAPS IN THE LITERATURE**

While the number of documents identified and profiled in this bibliography on the costs of substance abuse treatment, methods for estimating costs, and cost effectiveness and cost benefits of treatment is substantial, there are gaps in this literature. Exhibits III-2 and III-3 highlight the areas where more and less research has been directed. These summary tables indicate that to date, few cost/economic analyses have been completed on treatment for high profile populations such as adolescents, the elderly, women, and cocaine addicts. The criminal justice system and populations with co-occurring illness (mental health and substance abuse) are also areas where fewer studies have been conducted. Moreover, several levels/modalities of care of increasing policy concern have received minimal cost/economic study, including continuing care, self help, and independent treatment practitioners.

As the substance abuse treatment field continues to evolve and treatment methodologies improve, it will be important to continue to examine the costs of these treatments. Any area that is addressed with cost effectiveness studies is also amenable to cost of treatment studies.

## **IV. OVERVIEW OF DATA SOURCES**

## **IV. OVERVIEW OF DATA SOURCES**

The primary objective of this chapter is to identify the nature and amount of data that exist and have been used in the cost, cost effectiveness and cost benefit studies that have been performed to date. In addition, there are several additional data sets of potential value. While there have been a variety of data sources utilized in cost and economic analyses of substance abuse, there are few data sources that were primarily or specially designed to facilitate such analysis. Nonetheless, there is a rapidly growing body of literature that is generating an increased demand for data collection instruments, methods for estimating costs and benefits, and specification of standardized outcomes.

A distinction needs to be made between data concerning costs of treatment and data on the effectiveness or benefits of treatment. Data used for estimating the costs of treatment are different in nature from the data used in cost effectiveness and cost benefit studies. Data on the cost of treatment are more fundamental, and there is greater consensus (but not unanimity) about what these values are and how they can be estimated. Conversely, there is much diversity in how outcomes and benefits of substance abuse treatment are measured.

The studies listed in this bibliography have been characterized by such factors as primary focus and study design, source of cost data, and types of economic values assessed, according to the coding scheme presented in Exhibit IV-1. Exhibit IV-2 presents this information about the nature and amount of data used in each study. Data sources used in cost of treatment studies and those used for cost effectiveness and cost benefit studies are discussed in the following sections.

### **1. THE COSTS OF TREATMENT**

Costs of treatment are the most fundamental type of measure in economic analyses. Three cost estimation methods have been developed and used to various extents in recent years. These include:

- # Estimates of the cost of substance abuse treatment for providers
- # Cost estimates using insurance claims files
- # Estimates from national census databases.

Several studies have used a combination of data from multiple sources.

<b>EXHIBIT IV-1</b> <b>KEY TO ABSTRACTION AND CODING OF THE LITERATURE</b>	
<b>Study Characteristic</b>	<b>Key to Coding of Characteristic</b>
Type of study	Primary focus of study; some studies have multiple foci and the primary focus is listed first, followed by the other study types C: Cost of treatment CE: Cost effectiveness CB: Cost benefit (includes cost offset studies) M: Methodology report L: Literature review S: Simulation (model created based on available data)
Primary focus on cost/economics	An "x" is indicated if cost/economics is the primary or at least a material focus of the study
Study design/comparison population (only if cost-effectiveness, cost-benefit)	1: Non-randomized pre-post single type of care/population 2: Non-equivalent populations (same level of care, different approaches) 3: Non-equivalent populations (different levels of care) 4: Non-equivalent populations (treated versus untreated) 5: Random assignment A blank indicates that the information was either not applicable to the study type (methodology or literature reviews) or this information was not provided in the document.
Number of providers	# providers for/from which cost data was obtained
Number of clients	# clients for whom treatment cost data was available from claims or client survey
Year(s) of data	Calendar year in which data was collected
Source of cost data	1: Insurance claims for utilization of treatment 2: Provider cost data 3: Survey data collected from client 4: Other data
Success/improvement	An "x" is indicated if the study assessed outcome based on achievement of or improvement on a specific criterion
Quality/disability adjusted life years	An "x" is indicated if the study assessed outcomes using either quality adjusted life years (QALY) or disability adjusted life years (DALY)
Economic value: types of values for which a cost benefit study estimates benefits:	H: Health C: Crime and criminal justice W: Welfare P: Productivity

**EXHIBIT IV-2**  
**DESCRIPTION OF STUDY BY TYPE OF ANALYSIS, DATA AND OUTCOMES**

Study				Data				Type of Outcome/ Benefit		
First Author (Year)	Type of Study	Cost Primary Focus	Study Design/Comparison Population	# of Providers	# of Clients	Year(s) of Data	Source of Cost Data	Success/Improvement	Quality/Disability Adjusted Life Yrs.	Economic Value
Anderson (1998)	M,C	x		13		1993	2			
Bradley (1994)	M,C	x		3		NS	2			
CCC (1998)	M,C	x								
Fox (1995)	M,C	x	3	500	200000	1991	1,4			
French (1995) <sup>1</sup>	M,CB	x								
French (1996) <sup>1*</sup>	M, CE	x							x	
French (1997) <sup>1</sup>	M,C	x					2			
French (1997) <sup>2</sup>	M,C	x		3		1995	2			
Garnick (1996)	M, C	x		NS	NS	89-93	1			
Gold (1996)	M,CE									
Harwood (1999)	M,CB,CE	x								
Hser (1991)	M,CE,CB	x								
Hubbard (1991)	M,CE,CB	x								
Richman (1983)	M,CE	x								
Rydell (1994)	M,CE							x		
Salome (2001)	M, C	x		11		93-98	3			
Sheffet (1982)	M,CB	x	3	6	451	78-80	2,3			H
Sindelar (1997)	M,CE,CB	x								
Wing (1990)	M, CE,CB	x								
Yates (1999)	M,CE,CB	x								
Zarkin (1994)	M,CE,CB	x								
Alterman (2001)	L,CB									
Annis (1986)	L, CE	x								
Apsler (1991) <sup>1</sup>	L,CE	x								
Apsler (1991) <sup>2</sup>	L,CE	x								
Barnett (2000)	L,CE	x							x	
Beshai (1990)	L,CE									
Borkman (1998)	L, CE									
Cartwright (1998)	L,CB,CE	x								H,C,P,W
Cartwright (2000)	L,CB	x								
Finney (1996)	L,CE	x								
Fletcher (1999)	L,CB									
French (1995) <sup>2</sup>	L,CB	x								
French (1996) <sup>2</sup>	L,CB	x								
French (2000)	L,CE,CB	x								



**EXHIBIT IV-2 (CONT.)**  
**DESCRIPTION OF STUDY BY TYPE OF ANALYSIS, DATA AND OUTCOMES**

Study				Data				Type of Outcome/ Benefit		
First Author (Year)	Type of Study	Cost Primary Focus	Study Design/Comparison Population	# of Providers	# of Clients	Year(s) of Data	Source of Cost Data	Success/Improvement Quality/Disability Adjusted Life Yrs.		Economic Value
French (2001)	L,CE,CB	x								
Holder (1987) <sup>1</sup>	L,CB	x								
Holder (1991) <sup>2</sup>	L,CB	x								
Holder (1992) <sup>2</sup>	L,CB	x								
Holder (1992) <sup>3</sup>	L,CB	x								
Holder (1998)	L,CB	x								
Howard (1990)	L,CE									
Lennox (1992)	L,CE	x								
Leukefeld (1998)	L,CE	x								
Merrill (1999)	L,CE,CB	x								
Miller (1998)	L,CE									
Peele (1990)	L,CE	x								
Rutgers Univ (1993)	L,CB,CE	x								
Saxe (1983)	L,CB,C	x								
USDHHS (2000)	L,CE,CB									
Wexler (1996)*	L,M	x								
Wing (1991)	L,CB,CE	x								
Cartwright (1993)	C	x			165000	1987	1			
Cisler (1998)	C	x		3	430	NS	2			
Dayhoff (1994)	C	x		6489		1989	3			
French (1994)	C	x	2	4	352	1991	2			
French (2000) <sup>1</sup>	C	x								
Friedman (1993)	C	x		1	54	88-91	2,4			
Goodman (1991)	C	x	1	NS	NS	80-87	1			
Goodman (1992)	C	x	1		873	80-87	1			
Goodman (1996)	C	x	1		879	80-87	1			
Goodman (1997)	C	x	1		25495	89-91	1			
Goodman (1998)	C	x	1		9878	89-91	1			
Harwood (2001a) <sup>1</sup>	C	x		37		1997	2			
Harwood (2001b) <sup>2</sup>	C	x		60		1997	2			
Holder (1991) <sup>1</sup>	C	x	1		3888	74-87	1			H
Rosenbach (1994)	C	x			4214	89-90	1,3			
Schoenbaum (1998)	C	x	3	93	32647	1995	1			
Siegel (1984)	C	x		2		75-76	1			
Sturm (2001)	C	x			339265	91-97	1			

**EXHIBIT IV-2 (CONT.)**  
**DESCRIPTION OF STUDY BY TYPE OF ANALYSIS, DATA AND OUTCOMES**

Study				Data				Type of Outcome/ Benefit	
First Author (Year)	Type of Study	Cost Primary Focus	Study Design/Comparison Population	# of Providers	# of Clients	Year(s) of Data	Source of Cost Data	Success/Improvement Quality/Disability Adjusted Life Yrs.	Economic Value
Walsh (1991)	C		5		227	82-87	1,2	x	
Westermeyer (1998)	C	x		2	642	1996	2,3		
Alfano (1987)	CB	x	1	1	150	NS	1,3		P
Anglin (1989)	CB	x	4	4	584	80-81	3		W,C
Berkowitz (1996)	CB		1	7	1593	91-93	2		W,C
Blose (1991)	CB	x	1		2259	74-87	1		H
Booth (1997)	CB	x	3	172	85000	1987	1		H
Daley (2000)	CB	x	1	62	439	92-97	2		C
DeHart (1993)*	CB	x						x	H
Flynn (1999)	CB	x	1	19	502	1992	2,3		C
French (1991)	CB	x	2	41	2420	79-81	3		P
French (1992)*	CB	x	2						P
French (2000) <sup>2</sup>	CB	x	3		263	97-99	1,4		H,P,O
Gerson (2001)	CB	x	4		3168	93-94	1		H
Gerstein (1994)	CB	x	1	97	2000	91-92	2		H,C,P,W
Goodman (2000)	CB	x	1		4856	80-87	1		H
Hartz (1999)	CB	x	5	2	102		2		H
Harwood (1988)	CB	x	3	41	2420	79-81	2,3		C
Harwood (1998)*	CB	x	1		1825	1992	2		H,C,P,W
Harwood (2000)	CB	x	1	71	4411	90-91	3		H,C,P,W
Holder (1981)*	CB	x	1				1		H
Holder (1986) <sup>1</sup>	CB	x	1		1697	80-83	1		H
Holder (1986) <sup>2</sup>	CB	x	1		245	74-79	1		H
Holder (1987) <sup>2</sup>	CB	x	1		1645	80-83	1		H
Holder (1992) <sup>1</sup>	CB	x	1		3729	80-87	1		H
Holder (2000)	CB	x	5	3	279	93-95	2		H
Hughey (1996)	CB		4	1	260	91-93	2		C
Humphreys (1996)	CB	x	3		201	84-89	3	x	H
Humphreys (2001)	CB	x	2	10	1774	96-98	1	x	H
Jerrell (1996)	CB	x	5		132	90-91	1,2,4		H,C,W
Kashner (1992)	CB	x	5		137	87-89	1	x	H
Koenig (1999)	CB	x	1	72	5264	93-95	2,3		H,C,P,W
Koenig (2000a) <sup>1</sup>	CB	x	1	72	4411	93-95	2,3		H,C,P,W
Koenig (2000b) <sup>2</sup>	CB	x	1	72	3065	93-95	2,3		H,C,P,W
Lee (1998)*	CB		2		102				H
Lennox (1993)	CB	x	1		690	80-87	1		H
Lessard (1985)	CB	x	1	1	190	<85	3		H,C,W

**EXHIBIT IV-2 (CONT.)**  
**DESCRIPTION OF STUDY BY TYPE OF ANALYSIS, DATA AND OUTCOMES**

Study				Data				Type of Outcome/ Benefit		
First Author (Year)	Type of Study	Cost Primary Focus	Study Design/Comparison Population	# of Providers	# of Clients	Year(s) of Data	Source of Cost Data	Success/Improvement	Quality/Disability Adjusted Life Yrs.	Economic Value
Lo (1993)	CB	x	3	111	2928	82-85	1			H
Maddox (1996)*	CB		1	20				x		C
Mauser (1994)	CB	x	1	1	259	90-91	2,3			H
McGlothlin (1981)	CB	x	1	2	187	71-76	3			H,C,P,W
Mecca (1997)	CB	x	1		1990	1992	3			H,C,P,W
O'Farrell (1996) <sup>1</sup>	CB,CE	x	5	1	59	1992	2	x		H
O'Farrell (1996) <sup>2*</sup>	CB,CE	x	5		36	1992	2	x		H
Rajkumar (1997)*	CB	x	1		2420					C,O
Reutzel (1987)	CB	x	1		46	1983	1			H
Schoenwald (1996)	CB	x	5		118	93-95	2			H,C
Svikis (1997)	CB	x	4	2	146	91-92	2	x		H
Womer (1993)	CB	x	2		123	90-92	1			H
Yu (1991)	CB	x	2		327	85-89	1			H
Zywiak (1999)	CB	x	1		5434	NS	3	x		H
Alterman (1994)	CE	x	5	1	111	88-89	1	x		
Avants (1999)	CE	x	5	1	291	1995	2	x		
Bachman (1992)	CE		5	1	55	86-87	2,3	x		
Barker (1999)	CE		4	1	138	1995	1	x		
Barnett (1997)	CE	x	2	98	38863	89-90	2	x		
Bickman (1996)*	CE	x						x		x
Brent (1998)*	CE, CB	x			1689	77-81	4			P
Bury-Maynard (1999)*	CE	x						x		
Daley (2001)	CE	x	3	8	445	92-97	1	x		
Deschenes (1991)	CE	x	1		279	78-79	3			C
Fals-Stewart (1997)	CE,CB	x	5		80	91-93	2,3,4	x		H,C,W
Fink (1985)	CE		5	1	115	79-81	2,3	x		
Freeborn (1991)	CE	x			469	86-87	1	x		
French (1999)	CE	x	2		342	1994	2,3	x		
Griffith (2000)*	CE	x	4					x		
Hayashida (1989)	CE		5		164	85-87	1	x		
Kraft (1997)	CE	x	5	1	100	1991	2	x		
Longabaugh (1983)	CE	x	5		174	79-80	1,2,3	x		
Lu (1998)*	CE	x								
Machado (2001)	CE	x		38		91-94	2	x		
McCrary (1986)	CE		5		174	<83	2	x		
Miller (1980)	CE		5		41	<80	NS	x		

**EXHIBIT IV-2 (CONT.)**  
**DESCRIPTION OF STUDY BY TYPE OF ANALYSIS, DATA AND OUTCOMES**

Study				Data				Type of Outcome/ Benefit		
First Author (Year)	Type of Study	Cost Primary Focus	Study Design/Comparison Population	# of Providers	# of Clients	Year(s) of Data	Source of Cost Data	Success/Improvement	Quality/Disability Adjusted Life Yrs.	Economic Value
Pettinati (1999)	CE	x	3	1	173	88-92	2	x		
Reiff (1981)	CE	x	1		137	75-76	1			H
Schinka (1998)	CE	x	5	1	98	1996	2	x		
Schneider (1996)	CE		5	2	74	90-93	2	x		
Shepard (1997)*	CE	x	1	1	2941	93-95	3	x		
Vaughn (1998)*	CE	x	5					x		
Weisner (2000)	CE	x	5	1	688	93-97	2	x		
Barnett (1999)	S,CE	x							x	H
Barnett (2001)	S,CE	x	2						x	
Rosenheck (2001)	S,CE	x	2					x		
Zaric (2000)	S,CE	x					2,3,4	x		

\* = Could not locate publication. Coding based on electronic abstract.

1,2,3 = For studies published by the same first author in the same year, the superscript number corresponds to the order in which it appears in the annotated bibliography.

Excellent reports and discussions of data collection instruments and methods that can be used to develop estimates of the cost of substance abuse treatment for particular providers can be found in publications authored by Anderson et al., (1998), Capital Consulting Corporation (1998), and French et al. (1997). Other useful reports using data developed from these same methods are French and McGeary (1997), Harwood et al. (2001), and Salome and French (2001). Because these methods have been thus far only applied to small, unique samples of providers, the cost estimates presented in the studies cited in this bibliography should not be considered representative. Moreover, the results of the methods have not been rigorously compared to date.

Capital Consulting Corporation (CCC) developed a cost methodology for the Center for Substance Abuse Treatment (CSAT) entitled the Substance Abuse Treatment Cost Allocation and Analysis Template (SATCAAT) (CCC, 1998). This method applies generally accepted

accounting practices to the cost estimation. The ultimate product of the SATCAAT is unit cost calculations for selected types of services that comprise virtually all of the activities/services that substance abuse treatment service delivery units (SDUs) provide. A second data collection tool that can be used to estimate treatment costs is the Drug Abuse Treatment Cost Analysis Program (DATCAP) (French et al., 1997). The DATCAP also allows providers to generate total annual cost estimates for individual cost categories and for the treatment program as a whole. Both the SATCAAT and DATCAP cost estimation tools have been evolving in recent years. These tools are useful for providers in estimating the costs of providing treatment services and also allow for reliable comparisons of substance abuse treatment service costs across providers. The SATCAAT and DATCAP take different approaches in estimating treatment costs and readers are referred to the respective reports for more details on these cost methodology tools.

There are no central databases that contain data that have been collected from either the SATCAAT or DATCAP data collection tools. Both tools have been used for specific analytic purposes, and the data collected are generally not available for public use.

An alternative approach to the study of substance abuse treatment costs focuses on health insurance reimbursements. There have been substantially more of these studies using insurance claims data. This is due to the fact that these databases have a wealth of detail that is amenable to analysis. These claims datasets contain data on the actual payments that are made by the insurance company to the provider. Analysis of paid insurance claims is well-suited for use in estimating specialty substance abuse treatment costs for insured populations who are reimbursed by their health insurance. Unfortunately, insurance claims datasets do not contain data on the “out of pocket” costs paid by clients, including types of treatment/services that are not insured, costs that are in excess of insurance caps, and care obtained from publicly subsidized providers. Several of the better examples of this type of study include Garnick et al. (1996), Goodman et al. (1992; 1998) and Holder and Blose (1991). Most of these insurance claims cost analyses have been done with privately insured populations (all of the studies by Goodman et al. and Holder). Cost estimates have also been applied to the Medicare and Medicaid populations using data from the Centers for Medicare and Medicaid Services (see Cartwright & Ingster, 1993 and Rosenbach & Huber, 1994).

Insurance claims data are generally not available for public use, although some individual insurance providers will allow their data to be analyzed. A data source that contains insurance claims data of privately insured clients and that can be used in cost studies is the Medstat MarketScan. This dataset contains insurance claims data from a large number of insurance plans. This is a proprietary and expensive dataset, and use rights must be purchased from Medstat.

National estimates of spending on substance abuse treatment (see Mark et al., 2000) rely heavily on the national census of substance abuse treatment providers that has been performed by the U.S. Department of Health and Human Services periodically over the past 20 years. The most recent edition of this census has been named the National Survey of Substance Abuse Treatment Services (N-SSATS). Previously, it has been called the Uniform Facility Data Survey (UFDS) (Office of Applied Studies, 2000) and prior to that, the National Drug and Alcohol Treatment Unit Survey (NDATUS). These data have been collected for and maintained by the Substance Abuse and Mental Health Services Administration (SAMHSA), Office of Applied Studies. N-SSATS/UFDS/NDATUS economic data were collected for nine of the years between 1987 and 1998, inclusive. In 1998 data were obtained for about approximately 15,000 providers of substance abuse treatment. While the N-SSATS no longer collects revenue information due to high item non-response and concerns about the quality of the data, previous editions of the survey did contain some limited financial data. The primary economic/cost variable in UFDS/NDATUS is “total annual revenue” rather than a measure of “cost.” Cost and revenue are closely related, the difference being either “profit” or “loss” which typically is no more than several percent either way. However, because many providers are owned by government or non-profit entities, material amounts of revenues/costs in the form of donations and public subsidies are likely to be left out of revenue. The UFDS/NDATUS data with revenue must be specially requested from the Office of Applied Studies of SAMHSA.

Another dataset worthy of mention is the Alcohol and Drugs Services Survey (ADSS), which made the most ambitious and systematic effort to date to collect research quality data about the cost of treatment. The ADSS attempted to apply aspects of the CCC methodology to a representative sample of providers, with data collected via mail and telephone surveys. The results are eagerly awaited as a demonstration and test of new and improved data collection methods for cost estimation. This was funded by the Office of Applied Studies of SAMHSA and is being put up for public use through SAMHSA Web sites.

## **2. OUTCOMES AND BENEFITS OF TREATMENT**

There is even less standardization in terms of methods, data, and data sources in cost effectiveness and cost benefit studies than in cost of treatment studies. For various reasons, there are at this time no standardized economic outcome measures in general use for these types of studies. Accordingly, when these types of studies are performed, authors employ a variety of measures for outcomes or valuation of benefits. Each new study chooses from measures that have been previously used, or else they attempt to design new measures. Obviously, this makes it virtually impossible to make precise comparisons across studies (such as a rigorous “meta-

analysis”), although general conclusions are usually found to be consistent in nature. In this section we will identify selected studies that are good examples of types of outcome measures that are used.

In the general health field there is a rapid movement toward standardized outcome measurement to be employed in cost effectiveness analyses using quality adjusted life years (or QALYs) (Gold et al., 1996) or disability adjusted life years (DALY) (Murray & Lopez, 1996). This method has only been applied in a few substance abuse treatment studies (a good example of this is Barnett et al., 2000), and there are major unresolved theoretical and practical issues concerning application of this method (Hargreaves et al., 1998).

Other types of cost effectiveness studies do not use economic data for outcomes, but use non-economic outcomes such as alcohol/drug use, relapse to treatment or social functioning. Thus there are no databases or special methodologies that might be accessed. Effectiveness is almost always measured by level of substance use at follow up, most typically abstinence. However, abstinence can be and is measured across different intervals—continuous, past six months, past 30 days, etc. The cost data for these studies is usually taken from standard reimbursement “charges” used by the participating providers, or sometimes treatment costs are calculated using an estimation protocol such as those described by French et al. (1997) and Capital Consulting Corporation (1998).

Similar to cost effectiveness studies, cost benefit studies are variable in the type of economic factors they include in benefit measures. There are no standards and no established databases for this purpose. Each particular study tends to be unique. There are nonetheless a large subset of cost benefit studies that are similar in that they use health cost expenditures as the only/primary economic outcome measure (see Holder et al., 1986; Goodman et al., 2000; Lo & Woodward, 1993). These studies are almost always based on health insurance claims databases, with the strength of detailed, validated data about health care utilization and costs. However, such studies have virtually no information about severity of alcohol and drug problems at initiation of treatment and likewise no information about outcomes of treatment (use/abstinence, social functioning) other than subsequent health-care utilization and costs.

The interested reader is advised that virtually none of the respective data sets used in the cost, cost effectiveness, and cost benefit studies are in the public domain. Those with an interest in obtaining access to such data would need to contact the investigators that have analyzed the data in order to ascertain whether it is possible, and if so, under what conditions access would be possible.

## **VI. ANNOTATED BIBLIOGRAPHY**



## VI. ANNOTATED BIBLIOGRAPHY

**Alfano, A. M., Thurstin, A. H., & Nerviano, V. J. (1987). Cost/benefit estimates from ongoing alcoholism outcome research: A working paper. *The International Journal of the Addictions*, 22(9), 861-868.**

There is an increasing emphasis on cost-effectiveness for all forms of treatment, occurring in parallel with constraints on research dollars. It would therefore seem useful for investigators to try to use ongoing research data as a basis for demonstrating a positive economic impact when outcome data are available. Some thoughts and figures are presented from a large alcoholism project, for which there were also some treatment outcomes. These data permitted dollar estimates, in terms of community impact, which are offered as a basis for further discussion. Although crude, these types of estimates are seen as vital in making the economic arguments, which parallel those for the human misery side of substance abuse.

**Alterman, A. I., Langenbucher, J., & Morrison, R. L. (2001). State-level treatment outcome studies using administrative databases. *Evaluation Review*, 25(2), 162-183.**

State substance dependence administrative databases contain both administrative and clinical information on large numbers of patients collected over extended time periods. Access to other state databases--employment, criminal behavior, and Medicaid--has also been achieved in some instances. Such data could prove an important source for the evaluation of long-term treatment outcomes and their determinants. This selected review describes and evaluates the treatment outcome and cost-related findings of the most advanced studies using these databases. A number of these studies have shown that completion of substance dependence treatment is associated with reduced societal costs. Some of these studies have focused on significant subpopulations of patients, including pregnant women and adolescents. A shortcoming of the findings of most of these studies concerns their use of noncompleter or non-randomly collected comparison groups. The utility of these databases can be enhanced by coupling them with clinical research treatment outcome evaluation approaches.

**Alterman, A. I., O'Brien, C. P., McLellan, T., August, D. S., Snider, E. C., Droba, M., Cornish, J. W., Hall, C. P., Raphaelson, A. H., & Schirade, F. X. (1994). Effectiveness and costs of inpatient versus day hospital cocaine rehabilitation. *The Journal of Nervous and Mental Disease*, 182, 157-163.**

This paper compares the effectiveness and costs of day hospital (DH) versus inpatient (INP) rehabilitation for cocaine dependence. The research subjects were 111 inner city, lower socioeconomic, primarily African-American male veterans who qualified for a diagnosis of cocaine dependence and presented no acute medical or psychiatric conditions requiring inpatient treatment. Fifty-six men were randomly assigned to 1 month of DH rehabilitation (27 hours of weekday treatment weekly), and 55 were assigned to 1-month INP rehabilitation (48 hours of scheduled treatment weekly). Treatment outcome was evaluated 7 months after admission into treatment (92% of the subjects), and a cost

analysis was performed. A significantly greater proportion of INP subjects (89.1%) completed treatment than did DH subjects (53.6%). Significant improvements in substance use, psychosocial functioning, and health status were found 7 months postadmission for both groups, but there was little evidence of differential improvement between groups. Urine toxicology findings were consistent with the self-report data in showing improvement from baseline, but no group differences in cocaine use. The groups did not differ significantly in post-rehabilitation aftercare participation or in relapse to additional treatment. DH treatment costs were 40 percent to 60 percent of INP treatment costs, depending upon the measure used.

**Andersen, D. W., Bowland, B. J., Cartwright, W. S., & Bassin, G. (1998). Service-level costing of drug abuse treatment. *Journal of Substance Abuse Treatment, 15*, 201-211.**

This paper presents a methodology for estimating costs of delivering specific substance abuse treatment services. Data collected from 13 programs indicate that the mean cost of residential treatment is \$2,773 per patient per month, and outpatient treatment costs average \$636 per patient per month. Data are presented on the cost per patient per month for individual treatment and nontreatment services, average number of services, cost per unit of service, and intensity of services. In addition to their application to insurance benefit cost estimation, these data illustrate the costing of best-practice adolescent treatment consistent with a Center for Substance Abuse Treatment (CSAT) Treatment Improvement Protocol. In the emerging policy environment, detailed cost estimates like these will aid the design of cost-effective treatment programs, and serve the development of the substance abuse benefit in a health care reform insurance package.

**Anglin, M. D., Speckart, G. R., Booth, M. W., & Ryan, T. M. (1989). Consequences and costs of shutting off methadone. *Addictive Behaviors, 14*, 307-326.**

In the face of rising fiscal conservatism, many states and localities with sizable addict populations have reduced or eliminated public funding for methadone maintenance (MM) programs and permitted private-fee-for-service programs to replace them. The social and economic costs of these changed funding policies with reference to the California experience were analyzed. A two-and-a-half year follow-up of a sample of San Diego MM clients (195 men, 129 women) terminated from a public subsidized program compared outcome results to clients from publicly funded MM programs in Orange, Riverside and San Bernardino counties (129 men, 131 women). In a secondary analysis, San Diego clients who transferred into private (fee-for-service) treatment programs were compared with those who did not transfer. Major adverse consequences were found for clients unable or unwilling to transfer to private programs: higher crime and dealing rates, more contact with the criminal justice system, and higher rates of illicit drug use were demonstrated by nontransfer clients. Moreover, the savings resulting from a reduction of MM program costs were nearly offset by increased direct costs for incarceration, legal supervision, and other government-funded drug treatment. Indirect costs were not assessed.

**Annis, H. M. (1986). Is inpatient rehabilitation of the alcoholic cost effective? Con position. *Advances in Alcohol Substance Abuse*, 5(1-2):175-190.**

Across all sectors of the health care system there is pressure to increase the cost-effectiveness of service delivery. In recent years, a number of official reports in the alcoholism field have called for the establishment of alternatives to traditional inpatient hospitalization for alcoholics. This paper briefly reviews five bodies of scientific evidence that bear on this recommendation. It is concluded that: hospital alcoholism programs of a few weeks to a few months duration show no higher success rates than periods of brief hospitalization of a few days; the great majority of alcoholics seeking treatment for alcohol withdrawal can be safely detoxified without pharmacotherapy and in nonhospital-based units--detoxification with pharmacotherapy on an ambulatory basis has also been shown to be a safe alternative at one-tenth the cost; "partial hospitalization" (day treatment) programs have been found to have equal or superior results to inpatient hospitalization at one-half to one-third the cost; well-controlled trials have also demonstrated that outpatient programs can produce comparable results to inpatient programs--one estimate places the cost saving at \$3700 per patient compared with the typical course of inpatient treatment; and a growing body of evidence suggests that if patients could be matched on clinically significant dimensions to a range of treatment alternatives, much higher overall improvement rates in the alcoholism treatment field would be observed. The question that should guide future investigation is "What treatments are most effective for what types of alcoholics?"

**Apsler, R. (1991). Evaluating the cost-effectiveness of drug abuse treatment services. In W. S. Cartwright, & J. M. Kaple (Eds.), *Economic costs, cost-effectiveness, financing, and community-based drug treatment* (NIDA Research Monograph No. 113, pp. 56-66). Rockville, MD: National Institute on Drug Abuse.**

The author's review of the cost-effectiveness literature is a critical assessment of accomplishments to date. For his purpose, the important question is: are today's drug treatment programs cost-effective? He develops a three-part argument about the results in the literature. First, there is evidence that some "typical" drug programs are of "questionable" cost-effectiveness. Second, there is also evidence that some treatment strategies are cost-ineffective. Finally, there is evidence that certain treatments have a positive cost-effectiveness. Underlying these various estimates is what the author suggests is a lack of rigor in research design and implementation. To redress this, he recommends a renewed commitment to undertaking cost-effectiveness studies and to using better research methods.

**Apsler, R., & Harding, W. M. (1991). Cost-effectiveness analysis of drug abuse treatment: Current status and recommendations for future research. In *NIDA background papers on drug abuse financing and services research* (DHHS Publication No. ADM91-1777, pp. 58-81). Rockville, MD: National Institute on Drug Abuse.**

Current methodological developments and research findings on the drug abuse service delivery system are discussed. The critical areas of drug services research are identified as: (1) client; (2) treatment services; (3) treatment cost; (4) financing; (5) drug abuse services in context; and (6) services research infrastructure. Topics discussed include the importance of standardized and meaningful definitions of treatment; issues relating to current drug treatment capacity; cost effectiveness analysis; the importance of the workplace in dealing with the drug abuse problem; workplace policies on employee assistance programs, insurance coverage, and drug testing; and the state of knowledge, policy issues, and research questions about drug abuse treatment for pregnant women.

**Avants, S. K., Margolin, A., Sindelar, J. L., Rounsaville, B. J., Schottenfeld, R., Stine, S., Cooney, N. L., Rosenheck, R. A., Li, S., & Kosten, T. R. (1999). Day treatment versus enhanced standard methadone services for opioid-dependent patients: A comparison of clinical efficacy and cost. *American Journal of Psychiatry*, 156(1), 27-33.**

This study examined the differential efficacy and relative costs of two intensities of adjunctive psychosocial services--a day treatment program and enhanced standard care—for the treatment of opioid-dependent patients maintained on methadone hydrochloride. A 12-week randomized clinical trial with 6-month follow-up was conducted in a community-based methadone maintenance program. Of the 308 patients who met inclusion criteria, 291 began treatment (day treatment program: N=145; enhanced standard care: N=146), and 237 completed treatment (82% of those assigned to the day treatment program and 81% of those receiving enhanced standard care). Two hundred twenty of the patients participated in the 6-month follow-up (75% of those in the day treatment program and 73% of those in enhanced standard care provided a follow-up urine sample for screening). Both interventions were 12 weeks in duration, manual-guided, and provided by master's-level clinicians. The day treatment was an intensive, 25-hour-per-week program. The enhanced standard care was standard methadone maintenance plus a weekly skills training group and referral to on- and off-site services. Outcome measures included twice weekly urine toxicology screens, severity of addiction-related problems, prevalence of HIV risk behaviors, and program costs. Although the cost of the day treatment program was significantly higher, there was no significant difference in the two groups' use of either opiates or cocaine. Over the course of treatment, drug use, drug-related problems, and HIV risk behaviors decreased significantly for patients assigned to both treatment intensities. Improvements were maintained at follow-up. Providing an intensive day treatment program to unemployed, inner-city methadone patients was not cost-effective relative to a program of enhanced methadone maintenance services, which produced comparable outcomes at less than half the cost.

- Bachman, S. S., Batten, H. L., Minkoff, K., Higgins, R., Manzik, N., & Mahoney, D. (1992). Predicting success in a community treatment program for substance abusers. *The American Journal on Addictions*, 1(2), 155-167.**

This article evaluated the cost-effectiveness of an addiction day-treatment program (ADT) in comparison to a traditional inpatient treatment program. Using provider cost and survey data from 55 clients (23 assigned to ADT, 32 assigned to the inpatient program), the authors determined that the intensive outpatient program is less expensive than the inpatient program, and the patients are relatively satisfied with their respective treatments. ADT was also determined to be as effective as inpatient care up to 18 months after discharge. Therefore, ADT was recommended as a cost-effective alternative to inpatient treatment.

- Barker, S. B., Knisely, J. S., & Dawson, K. S. (1999). The evaluation of a consultation service for delivery of substance abuse services in a hospital setting. *Journal of Addictive Diseases*, 18(1), 73-82.**

This study evaluated the institutional impact of a substance abuse consultation service in a hospital setting. Treatment and matched comparison groups were compared on five outcome variables: length of stay, total cost, reimbursement, readmission, and appropriateness of care. The treatment group consisted of patients with discharge diagnoses falling into targeted Diagnostic Resource Groups (DRGs) and who received a substance abuse consultation. The comparison group consisted of patients with the same targeted DRGs, a coexisting substance abuse diagnosis, and who did not receive a substance abuse consultation. No statistically significant differences were found for the five outcome variables. Findings closely approached statistical significance for rate of readmission with treatment patients being less likely to be readmitted during the 12 months following the consultation. Although cost savings were not found during the hospitalization when the substance abuse consultation was provided, the data suggests that the consultation may reduce the need for readmission during the year following discharge.

- Barnett, P. G. (1999). The cost-effectiveness of methadone maintenance as a health care intervention. *Addiction (England)*, 94(4), 479-488.**

Cost-effectiveness analysis using life-years of survival as the measure of treatment benefit is widely used in the economic evaluation of health care interventions but has not been applied to substance abuse treatment. The cost-effectiveness of methadone maintenance was evaluated to demonstrate the feasibility of applying this method to substance abuse treatment. A literature review was undertaken to determine the effect of methadone treatment on the rate of mortality associated with opiate addiction. Information was also obtained on the average cost and duration of treatment. A two-state Markov model was used to estimate the incremental effect of methadone on the life span and treatment cost of a cohort of 25-year-old heroin users. Providing opiate addicts with access to methadone maintenance has an incremental cost-effectiveness ratio of \$5915 per life-year

gained (that is, for every year of life that is saved by providing methadone to opiate addicts, an additional \$5915 in treatment costs are incurred). One-way sensitivity analysis determined that the ratio was less than \$10,000 per-life year over a wide range of modeling assumptions. The ratio determined for methadone is lower than that of many common medical therapies, and well within the \$50,000 threshold for judging cost-effectiveness. Even if decision makers do not wish to use the same ratio that is applied to the general population, this method allows substance abuse treatment enhancements to be compared to improvements in health services offered to individuals with substance abuse disorders. Future work will require information on the impact of methadone treatment on the cost of health care and public programs, the indirect costs incurred by patients, and adjustments to reflect quality of life.

**Barnett, P. G., & Hui, S. S. (2000). The cost-effectiveness of methadone maintenance. *The Mount Sinai Journal of Medicine*, 67(5-6), 365-374.**

Although methadone maintenance is effective in reducing injection drug use, needle sharing, and the overall mortality associated with opiate abuse, many health plans offer little or no access to methadone, and many methadone providers do not comply with treatment guidelines regarding dose, duration of treatment, or provision of ancillary services. Moral and political judgments have helped shape the U.S. treatment system. Evaluations of methadone cost-effectiveness may play a role in changing public policy. Cost-effectiveness analysis is used to compare a change, or changes, in treatment to that of current standard care. The cost of treatment and its effect on outcomes are used to find the incremental cost-effectiveness ratio, and determine whether the change(s) should be adopted. The literature on methadone maintenance is reviewed from an economic perspective, focusing on five policy questions: (1) whether methadone should be a health care benefit; (2) what level of ancillary services is optimal; (3) what methadone dose is appropriate; (4) what length of treatment is appropriate; and (5) whether contingency contracts should be employed. Expanded access to methadone maintenance has an incremental cost-effectiveness ratio of less than \$11,000 per Quality-Adjusted Life Year. This is more cost-effective than many widely used medical therapies, a finding that strongly supports the inclusion of methadone in the formulary of health care plans. Ancillary services have been shown to be an effective part of methadone maintenance therapy, especially during the beginning of a treatment episode, but there is not enough information available to tell whether the optimal amount of services is being used. There is extensive evidence that many treatment programs dispense inadequate doses of methadone. The cost of additional drugs is very small compared to the benefits of an adequate dose. Many methadone programs limit treatment to 6 months or less, but such short episodes are not likely to be cost-effective. The medical model of methadone maintenance may increase the cost-effectiveness of the treatment for long-term patients. Programs that reward patients for negative urinalysis have proven effective at reducing illicit drug use, but their cost-effectiveness will need to be demonstrated before they are widely adopted. Cost-effectiveness researchers need to measure substance abuse outcomes in terms of Quality-Adjusted Life Years, as this will make their findings more

relevant to the development of treatment policy. It will allow different substance abuse treatments to be compared to each other and to medical care interventions.

**Barnett, P. G., & Swindle, R. W. (1997). Cost-effectiveness of inpatient substance abuse treatment. *Health Services Research*, 32(5), 615-629.**

The objective of this study was to identify the characteristics of cost-effective inpatient substance abuse treatment programs. The study included a survey of program directors and cost and discharge data for 38,863 patients treated in 98 Veterans Affairs treatment programs. Random-effects regression was used to find the effect of program and patient characteristics on cost and readmission rates. A treatment was defined as successful if the patient was not readmitted for psychiatric or substance abuse care within six months. Treatment was more expensive when the program was smaller, or had a longer intended length of stay (LOS), or a higher ratio of staff to patients. Readmission was less likely when the program was smaller or had longer intended LOS; the staff to patient ratio had no significant effect. The average treatment cost \$3,754 with a 75 percent chance of being effective, a cost-effectiveness ratio of \$5,007 per treatment success. A 28-day treatment program was \$860 more costly and 3.3 percent more effective than a 21-day program, an incremental cost-effectiveness of \$26,450 per treatment success. Patient characteristics did not affect readmission rates in the same way they affected costs. Patients with a history of prior treatment were more likely to be readmitted but their subsequent stays were less costly. A 21-day limit on intended LOS would increase the cost-effectiveness of treatment programs. Consolidation of small programs would reduce cost, but would also reduce access to treatment. Reduction of the staff to patient ratio would increase the cost-effectiveness of the most intensively staffed programs.

**Barnett, P. G., Zaric, G. S., & Brandeau, M. L. (2001). The cost-effectiveness of buprenorphine maintenance therapy for opiate addiction in the United States. *Addiction (England)*, 96(9), 1276-1278.**

To determine the cost-effectiveness of buprenorphine maintenance therapy for opiate addiction in the United States, particularly its effect on the HIV epidemic, the researchers developed a dynamic model to capture the effects of adding buprenorphine maintenance to the current opiate dependence treatment system. They evaluated incremental costs, including all health-care costs, and incremental effectiveness, measured as quality-adjusted life years (QALYs) of survival. Communities with HIV prevalence among injection drug users of 5 percent and 40 percent were considered. Because no price has been set in the United States for a dose of buprenorphine, three prices per dose were considered: \$5, \$15, and \$30. If buprenorphine increases the number of individuals in maintenance treatment by 10 percent, but does not affect the number of individuals receiving methadone maintenance, the cost-effectiveness ratios for buprenorphine maintenance therapy are less than \$45,000 per QALY gained for all prices, in both the low-prevalence and high-prevalence communities. If the same number of individuals enter buprenorphine maintenance (10% of the number currently in methadone), but half are injection drug users newly entering maintenance and half are individuals who

switched from methadone to buprenorphine, the cost-effectiveness ratios in both communities are less than \$45,000 per QALY gained for the \$5 and \$15 prices, and greater than \$65,000 per QALY gained for the \$30 price. At a price of \$5 or less per dose, buprenorphine maintenance is cost-effective under all scenarios considered. At \$15 per dose, it is cost-effective if its adoption does not lead to a net decline in methadone use, or if a medium to high value is assigned to the years of life lived by injection drug users and those in maintenance therapy. At \$30 per dose, buprenorphine will be cost-effective only under the most optimistic modeling assumptions.

**Berkowitz, G., Brindis, C., Clayson, Z., & Peterson, S. (1996). Options for recovery: Promoting success among women mandated to treatment. *Journal of Psychoactive Drugs*, 28(1), 31-38.**

In recent years imprisonment has been used increasingly for a wide range of nonviolent and petty offenses committed by women. Among incarcerated women, particularly those who are pregnant or parenting, substance use and its deleterious consequences are often exacerbated by imprisonment. Women who have been identified as chemically dependent are also at high risk for losing custody of their children. In California, the Options for Recovery (OFR) treatment program provided an alternative to incarceration or relinquishment of custody of children for chemically dependent pregnant and parenting women. This three-year pilot project offered alcohol and other drug abuse treatment and case management to these women, and included special training and recruitment of foster parents for their children. Findings from a three-year, multimethod evaluation study showed that women who were mandated to OFR treatment programs were more likely to successfully complete treatment than women who had enrolled in OFR voluntarily. An economic analysis of the costs associated with women in OFR compared with the combined costs of incarceration and alcohol and other drug abuse treatment produced a ratio in favor of OFR. Additionally, some innovative service alternatives for women mandated to treatment were developed during the project. The impact of such changes have implications for improving women's and family health.

**Beshai, N. N. (1990). Providing cost efficient detoxification services to alcoholic patients. *Public Health Reports*, 105(5), 475-481.**

The literature was reviewed to determine whether social model detoxification programs are safe and adequate for treating persons with alcohol withdrawal symptoms. The alcohol withdrawal syndrome has three stages. Each stage, more severe than the last, is reached by a smaller percentage of those withdrawing from alcohol. The literature showed that the majority of alcoholics can be detoxified safely in social model programs. These programs presented two main benefits, program cost efficiency and the patients' increased commitment to treatment compared with those treated at medical model programs. Medically operated detoxification programs appeared necessary for patients with a severe withdrawal condition at intake (abnormal blood pressure and pulse) and those with a history of severe withdrawal symptomatology. The results of the review



reiterated the importance of screening clients at intake to ensure the safety of the patient and the appropriateness of the detoxification program.

**Bickman, L. (1996). Implications for evaluators for the Fort Bragg evaluation. *Evaluation Practice*, 17, 57-74.**

This article is a cost-effectiveness evaluation of the Fort Bragg Child and Adolescent Mental Health Demonstration (CAMHD). The program is designed to provide integrated mental health and substance abuse treatment. Outcomes measured include satisfaction and clinical outcomes. Cost savings were also recorded.

**Blose, J. O., & Holder, H. D. (1991). The utilization of medical care by treated alcoholics: Longitudinal patterns by age, gender, and type of care. *Journal of Substance Abuse*, 3(1), 13-27.**

This study examined how the impact of alcoholism treatment on overall health care cost is related to age, gender, and maturation (aging). Variations in the type of health care used also were examined. Data were obtained on treated alcoholics (both employees and dependents) who were health insurance enrollees of a large midwestern manufacturing corporation during the years 1974-1987. Treated alcoholics with a minimum of 6 years of continuous insurance coverage (N = 2,259) were included in the analysis. No treatment - related differences in overall health care cost were found between men and women. Significant differences were found by age: On the average, individuals in the 30 and under and the 31-50 age groups experienced declines in health care costs following initiation of treatment, whereas those over 50 experienced increasing costs. When compared to a group of nonalcoholics of the same age and gender, alcoholics had significantly higher costs on the average. Both groups showed gradually increasing costs during a 10-year pretreatment period, demonstrating the effect of aging on long-term health care costs. The gap between the two groups narrowed following treatment, suggesting the convergence of the alcoholics to their age and gender cohort baseline may potentially occur over time.

**Booth, B.M., Blow, F. C., Cook, C. A. L., Bunn, J. Y., & Fortney, J. C. (1997). Relationship between inpatient alcoholism treatment and longitudinal changes in health care utilization. *Journal of Studies on Alcohol*, 58, 625-637.**

The purpose of the study was to evaluate changes in health care utilization associated with inpatient alcoholism treatment in alcoholics of low socioeconomic status with different histories of treatment relapse. The sample consisted of more than 85,000 male alcoholics using inpatient care in Department of Veterans Affairs medical centers in fiscal year 1987. Five treatment groups were identified to represent a continuum of length and intensity of alcoholism treatment, including formal inpatient alcoholism treatment, short detoxification and hospitalizations for primary diagnoses other than alcoholism. All inpatient and outpatient health services for 3 years before and 3 years after the index hospitalization were examined for differential changes in utilization associated with the

five treatment groups after controlling for patient predisposing, enabling and need characteristics. Both total inpatient days and outpatient visits increased significantly for all treatment groups, with the greatest increases occurring in the group completing inpatient alcoholism treatment (both  $p < .0001$ ). However, use of inpatient medical care decreased and substance abuse inpatient care increased significantly for most groups, with the largest increases in substance abuse care found for the completed treatment group. In a hospital system that does not deny care on the basis of ability to pay, certain groups of chronic alcoholics who cannot sustain prolonged remission will continue to be heavy utilizers of services. Alcoholism treatment may be associated with higher short-term costs but it remains to be seen whether provision of more focused treatment services is able to achieve longer term better outcomes and, ultimately, lower costs.

**Borkman, T. J., Kaskutas, L. A., Room, J., Bryan, K., & Barrows, D. (1998). An historical and developmental analysis of social model programs. *Journal of Substance Abuse Treatment*, 15(1), 7-17.**

This review synthesizes the philosophy, development, history, and current status of the social or community model of recovery and of Social Model Programs (SMPs) based on an analysis of the available literature, much of it outside traditional sources. The social-community model of recovery evolved out of Alcoholics Anonymous (AA), and has a distinctive program philosophy with different assumptions, knowledge, and practice than professionally based treatment models. SMPs began in the 1940s in California, evolving by the 1980s into a continuum of recovery services that are publicly funded, legally incorporated nonprofit organizations. The characteristics of SMPs are described and the range of services are presented, including social setting detoxification, residential recovery homes, non-residential neighborhood recovery centers and sober living houses. SMPs are staffed exclusively by recovering alcoholics and their structure is based on the 12 traditions of AA, which emphasize democratic group processes with shared and rotated leadership and a minimal hierarchy. Cost effectiveness data suggest that residential social model programs average approximately \$2,700 per stay versus \$4,400 for other residential approaches, yet may offer similar outcomes in terms of substance use and improvement in employment or family function.

**Bradley, C. J., French, M. T., & Rachal, V. (1994). Financing and cost of standard and enhanced methadone treatment. *Journal of Substance Abuse Treatment*, 11(5), 433-442.**

Although some national surveys of drug abuse treatment have examined cost and financing issues, this study is one of the first to rigorously analyze the costs and financing of methadone treatment at the program level. Findings were similar to those found at the national level for treatment cost but deviated significantly from the National Drug and Alcoholism Treatment Unit Survey (NDATUS) findings on funding sources. In addition to examining financing and total cost, this study grouped resources into particular categories and examined variations at the client, program, regimen, and setting levels. Specific findings showed that public funding sources overwhelmingly support the

programs examined; the average annual cost per client for standard methadone treatment was between \$3,750 and \$4,400; the marginal cost of providing enhanced treatment was between 5 percent and 6 percent of the total annual cost of standard treatment; and the average annual cost at the freestanding community-based programs was significantly different from the average annual cost at the hospital-based treatment program. The results provide a treatment cost methodology along with a financial profile of treatment operations at three clinics that can be compared across programs and settings.

**Brent, R. J. (1998). Estimating the effectiveness and benefits of alcohol treatment programs for use in economic evaluations. *Applied Economics*, 30(2), 217.**

This paper describes a method based on random utility theory for use in economic evaluations of alcohol treatment program effectiveness. The method defines a "standard unit of effectiveness" for cost-effectiveness studies and supplies monetary measures of the units of effectiveness to assist in cost-benefit analyses. A scale of equivalences for the behavioral variables is constructed using reduction in alcohol drinking as the unit of account. The model is then applied to a sample of 1,689 observations from the National Alcoholism Program Information System.

**Bury-Maynard, D. (1999). Developing a utility index for substance abuse: Theory and application. (Doctoral dissertation, University of Michigan, 1999). *Dissertation Abstracts International, A: The Humanities and Social Sciences*, 60(2), 2246-A-2247-A.**

This dissertation suggests that a common denominator for describing the effectiveness of a treatment would make comparisons between programs easier. This study created a utility index that would quantify quality of life improvements due to substance abuse treatment. The study quantified the burden of an individual's substance abuse on society, created a utility index from a societal perspective to estimate QALY of substance abuse treatment, and tested the utility index, which was created using data from substance abuse treatment programs.

**Caliber Associates (1999). *Cost benefit of substance abuse treatment: Selected bibliographies, 1990-1998* (NEDTAC Contract No. 270-94-0001). Fairfax, VA: Caliber Associates.**

This document provides an annotated list of available background materials that examine ways to measure the cost-effectiveness and benefit of existing substance abuse treatment programs. Materials also describe alternatives to existing modes of substance abuse treatment.

**Capital Consulting Corporation. (1998). *Measuring the cost of substance abuse treatment services: An overview* (Contract for the Center for Substance Abuse Treatment, SAMHSA).**

This overview report describes the Uniform Accounting System developed by the Program Evaluation Branch of the Center for Substance Abuse Treatment. The system's uses and cost methodology are described, along with examples of current application. The issues involved in creating a standardized approach to assessing and allocating substance abuse treatment costs are summarized.

**Cartwright, W. S. (1998). Cost-benefit and cost-effectiveness analysis of drug abuse treatment services. *Evaluation Review*, 22, 609-636.**

The foundations of cost-benefit analysis and cost-effectiveness analysis (CB/CEA) for drug abuse treatment are developed. An economic model of addict choice and drug markets is presented. This model is synthesized with the current "cost of illness" methods used to measure the burden of the disease to society. The problem of doing cost-effectiveness studies in the presence of large nonhealth benefits is examined, and guidance is offered to clinical studies with a cost-effectiveness component or to stand-alone cost-effectiveness studies. References and an extensive bibliography on drug abuse treatment-related CB/CEA studies are appended.

**Cartwright, W. S. (2000). Cost-benefit analysis of drug treatment services: Review of the literature. *The Journal of Mental Health Policy and Economics*, 3(1), 11-26.**

This article is a literature review of cost-benefit analysis of drug treatment services with scientific merit. The review provides analysts with a picture of the current state of research and decision-makers with information with regards to available evidence for policy purposes. Cost-benefit studies reviewed include (1) planning models for delivery systems, (2) short-term follow-up studies of individuals, (3) single individual programs and (4) state system's monitoring of outcomes. Overall, studies demonstrate that drug abuse treatment services can be considered to be contributing positive economic returns to society, although much work still needs to be done to standardize methods, while studies on women and adolescents are sparse.

**Cartwright, W. S., & Ingster, L. M. (1993). A patient-based analysis of drug disorder diagnoses in the Medicare population. *Health Care Financing Review*, 15(2), 89-101.**

This article utilizes the Part A Medicare provider analysis and review (MEDPAR) file for fiscal year (FY) 1987. The discharge records were organized into a patient-based record that included alcohol, drug, and mental (ADM) disorder diagnoses as well as measures of resource use. The authors found that there were substantially higher costs of health care incurred by the drug disorder diagnosed population. Those of the Medicare population diagnosed with drug disorders had longer lengths of stay (LOSs), higher hospital charges, and more discharges. Costs increased monotonically as the number of drug diagnoses

increased. Overlap of mental and alcohol problems is presented for the drug disorder diagnosed population.

**Cisler, R., Holder, H. D., Longabaugh, R., Stout, R. L., & Zweben, A. (1998). Actual and estimated replication costs for alcohol treatment modalities: Case study from Project MATCH. *Journal of Studies in Alcohol*, 59, 503-512.**

As a first step in a thorough cost-effectiveness analysis of a randomized alcohol-treatment-matching trial (Project MATCH), the present study examined the relative costs of three manual-guided, individually delivered treatments and the costs of replicating them in nonresearch settings. Costs of delivering a 12-session Cognitive Behavioral Therapy (CBT), a 4-session Motivational Enhancement Therapy (MET) and a 12-session Twelve-Step Facilitation (TSF) treatment over 12 weeks were assessed for three treatment sites at two of the nine Project MATCH locations (Milwaukee, WI, and Providence, RI). Research cost calculations included clinical, administrative and training/supervision variables in determining total treatment costs, average cost per contact hour and average cost per research participant. Investigators from all nine MATCH locations estimated direct clinical costs, administrative overhead costs and training/supervision costs for replicating these treatments. For Project MATCH, MET cost twice as much or more per patient contact hour (mean=\$498) than CBT (mean=\$198) and TSF (mean=\$1,969). For clinical replication, high end per patient costs ranged from \$512 for MET to \$750 for TSF to \$788 for CBT: a cost savings for MET of \$238 (32%) over TSF and \$276 (35%) over CBT. As part of a randomized clinical trial, MATCH treatments are costly to produce. However, when estimates are used to project these costs to nonresearch clinical settings, the costs are greatly reduced. Whereas MET appears to be much less costly to deliver in nonresearch settings than the other two treatments, the estimated cost differentials are less than the 1:3 treatment session ratio for MET versus TSF or CBT.

**Daley, M., Argeriou, M., McCarty, D., Callahan, J. J., Jr., Shepard, D. S., & Williams, C. N. (2000). The costs of crime and the benefits of substance abuse treatment for pregnant women. *Journal of Substance Abuse Treatment*, 19, 445-458.**

Although many pregnant, drug-dependent women report extensive criminal justice involvement, few studies have examined reductions in crime as an outcome of substance abuse treatment programs for pregnant women. This is unfortunate, because maternal criminal involvement can have serious health and cost implications for the unborn child, the mother and society. Using the Addiction Severity Index, differences in pre- and posttreatment criminal involvement were measured for a sample of 439 pregnant women who entered publicly funded treatment programs in Massachusetts between 1992 and 1997. Accepted cost of illness methods were supplemented with information from the Bureau of Justice Statistics to estimate the costs and benefits of five treatment modalities: detoxification only (used as a minimal treatment comparison group), methadone only, residential only, outpatient only, and residential/outpatient combined. Projected to a year, the net benefits (avoided costs of crime net of treatment costs) ranged from \$32,772 for

residential only to \$3,072 for detoxification. Although all five modalities paid for themselves by reducing criminal activities, multivariate regressions controlling for baseline differences between the groups showed that reductions in crime and related costs were significantly greater for women in the two residential programs. The study provides economic justification for the continuation and possible expansion of residential substance abuse treatment programs for criminally involved pregnant women.

**Daley, M., Argeriou, M., McCarty, D., Callahan, J. J., Jr., Shepard, D. S., & Williams, C. N. (2001). The impact of substance abuse treatment modality on birth weight and health care expenditures. *Journal of Psychoactive Drugs*, 33(1), 57-66.**

During the 1990s, substance abuse treatment programs were developed for pregnant women to help improve infant birth outcomes, reduce maternal drug dependency and promote positive lifestyle changes. This study compared the relative impact of five treatment modalities— residential, outpatient, residential/outpatient, methadone and detoxification-only—on infant birth weight and perinatal health care expenditures for a sample of 445 Medicaid-eligible pregnant women who received treatment in Massachusetts between 1992 and 1997. Costs and outcomes were measured using the Addiction Severity Index and data from birth certificates, substance abuse treatment records and Medicaid claims. Multiple regression was used to control for intake differences between the groups. Results showed a near linear relationship between birth weight and amount of treatment received. Women who received the most treatment (the residential/outpatient group) delivered infants who were 190 grams heavier than those who received the least treatment (the detoxification-only group) for an additional cost of \$17,211. Outpatient programs were the most cost-effective option, increasing birth weight by 139 grams over detoxification-only for an investment of only \$1,788 in additional health care and treatment costs. A second regression using five intermediate treatment outcomes--prenatal care, weight gain, relapse, tobacco use and infection--suggested that increases in birth weight were due primarily to improved nutrition and reduced drug use, behaviors which are perhaps more easily influenced in residential settings.

**Dayhoff, D. A., Pope G. C., & Huber, J. H. (1994). State variations in public and private alcoholism treatment at specialty substance abuse treatment facilities. *Journal of Studies on Alcohol*, 55(5), 549-560.**

This article reports characteristics of state specialty alcoholism treatment systems estimated from the 1989 National Drug and Alcohol Treatment Unit Survey (NDATUS). NDATUS is adjusted to correct for item nonresponse and differential unit nonresponse across states. An estimated \$3.8 billion was spent nationally on specialty alcoholism treatment in 1989. Per capita funding ranged from \$52 in Alaska to \$6 in Mississippi. Clients in treatment per capita and funding per client-day each varied more than 10-fold across states. Comparison of treatment system measures with indicators of the need for alcoholism treatment showed little systematic relationship across states.

**DeHart, S. S., & Hoffman, N. G. (1993). Cost savings of treatment. *Counselor*, 14-16.**

Decisions about alcoholism treatment for the elderly are varied across the United States. Some health care professionals and families believe that alcoholism treatment is less effective for the elderly and that treatment should be focused on the younger, higher risk groups. This view is not substantiated by the current study, which yielded a positive evaluation of long-term outcomes two years post substance abuse treatment for the elderly. Recovering and abstinent elderly are generally healthier and require fewer medical services. In contrast, elderly who relapse following substance abuse treatment and continue to use alcohol and other drugs, continue to use a disproportionate amount of health care services, including hospitalization.

**Deschenes, E. P., Anglin, M. D., & Speckart, G. (1991). Narcotics addiction: Related criminal careers, social and economic costs. *The Journal of Drug Issues*, 21(2), 383-411.**

A sample of 279 male heroin addicts admitted to methadone maintenance programs in Southern California, interviewed between 1978 and 1980, reported high rates of drug trafficking and over 250,000 property crime days, which resulted in 6251 arrests. Analyses indicate that offense rates and related social and economic costs were at their highest during periods of addiction. The aggregate cost to society, including criminal justice system and drug treatment intervention, is conservatively estimated at \$85 million, averaging \$20,000 per subject per year. These findings provide an empirical basis against which to evaluate the cost-effectiveness of alternative interventions.

**Fals-Stewart, W., O'Farrell, T. J., & Birchler, G. R. (1997). Behavioral couples therapy for male substance-abusing patients: A cost outcomes analysis. *Journal of Consulting and Clinical Psychology*, 65(5), 789-802.**

The cost outcomes for married or cohabiting substance-abusing male patients (N = 80) who were randomly assigned to receive either behavioral couples therapy (BCT) or individual-based treatment (IBT) were compared. Social costs incurred by patients in several areas (e.g., cost of substance abuse treatment, support from public assistance) during the year before and the year after treatment were estimated. BCT was more cost-beneficial than IBT; although the monetary outlays for delivering IBT and BCT were not different, the average reduction in aggregate social costs from baseline to follow-up was greater for patients who received BCT (i.e., \$6,628) than for patients who received IBT (i.e., \$1,904). BCT was also more cost-effective than IBT; for each \$100 spent on the treatment, BCT produced greater improvements than IBT on several indicators of treatment outcome (e.g., fewer days of substance use, fewer legal problems).

**Fink, E. B., Longabaugh, R., McCrady, B. M., Stout, R. L., Beattie, M., Ruggieri-Authalet, A., & McNeil, D. (1985). Effectiveness of alcoholism treatment in partial versus inpatient settings: Twenty-four month outcomes. *Addictive Behaviors, 10*, 235-248.**

The authors examined the effectiveness of the partial hospital setting, in contrast to the inpatient setting, for the rehabilitation of alcohol abusers and alcoholics. Outcomes after 24 months in five life health areas indicated marked improvement from baseline for the entire follow-up period on almost all measures. There also was a strong relationship between drinking outcomes and outcomes in the other health areas. Although there were few between group differences on the clinical outcome measures, differences which were found favored the partial hospital setting. Furthermore, cost of treatment over two years clearly favored the partial hospital setting.

**Finney, J. W., & Monahan, S. C. (1996). The cost-effectiveness of treatment for alcoholism: A second approximation. *Journal of Studies on Alcohol, 57*, 229-243.**

This review builds on the innovative research synthesis of Holder and his colleagues, addresses some of the limitations of the box-score approach to assessing treatment effectiveness that they used, and provides a second approximation of the cost-effectiveness of treatment for alcoholism. Each of 141 comparative treatment studies was examined to determine whether or not the study found at least one statistically significant positive effect on a drinking-related outcome variable for each of the modalities examined in a paired contrast with one other condition. Next, the researchers calculated the predicted probability of each study yielding at least one statistically significant treatment effect, based on the number of tests for treatment effects conducted. Following that, for each study of a particular treatment modality, the strength of the "weakest competitor" against which the modality had been compared was determined. For each modality, the authors used the average predicted probability of the relevant studies finding a significant effect and the average effectiveness of the weakest competitor to predict the modality's effectiveness. An Adjusted Effectiveness Index (AEIn) was calculated for each modality, which was the difference between its predicted and actual effectiveness score. AEIn results were consistent with those of Holder et al. in suggesting that some of the same modalities appear to be effective or ineffective. These results differed from their findings with respect to other modalities, however. Using data presented by Holder and his colleagues on the minimum estimated cost of providing different modalities, the authors offer a second approximation of the modalities' cost-effectiveness. Overall, they found a smaller range of effectiveness across modalities than did Holder and his colleagues and a nonsignificant relationship between cost and effectiveness. Like Holder et al., the authors do not believe major treatment provision or funding decisions should be based solely on this type of review.



**Fletcher, B. W., & Battjes, R. J., (1999). Introduction to the special issue: Treatment process in DATOS. *Drug and Alcohol Dependence*, 57(2), 81-87.**

Several important findings from the Drug Abuse Treatment Outcome Studies (DATOS) are presented in this issue of *Drug and Alcohol Dependence*. These studies focus on the drug abuse treatment process in areas of engagement in treatment and participation in program activities, the effect of the patient's age and treatment history in predicting treatment retention and outcomes, and the impact of prior treatment experience on the level of treatment engagement and subsequent outcomes. A cost-benefit model for drug abuse treatment is developed. Significant contributions are made in the development of a comprehensive model of the treatment process, including the relationship of patient attributes, program factors, and outcomes. Findings on retention from the United Kingdom's National Treatment Outcome Research Study (NTORS), a study similar in design to DATOS, also are presented.

**Flynn, P. M., Kristiansen, P. L., Porto, J. V., & Hubbard, R. L. (1999). Costs and benefits of treatment for cocaine addiction in DATOS. *Drug and Alcohol Dependence*, 57, 167-174.**

The objective of this study was to examine the cost of long-term residential (LTR) and outpatient drug-free (ODF) treatments for cocaine-dependent patients participating in the Drug Abuse Treatment Outcome Studies (DATOS), calculate the tangible cost of crime to society, and determine treatment benefits. Subjects were 502 cocaine-dependent patients selected from a national and naturalistic nonexperimental evaluation of community-based treatment. Financial data were available for programs from 10 U.S. cities where the subjects received treatment between 1991 and 1993. Treatment costs were estimated from the 1992 National Drug Abuse Treatment Unit Survey (NDATUS), and tangible costs of crime were estimated from reports of illegal acts committed before, during, and after treatment. Sensitivity analyses examined results for three methods of estimating the costs of crime and cost-benefit ratios. Results showed that cocaine-dependent patients treated in both LTR and ODF programs had reductions in costs of crime from before to after treatment. LTR patients had the highest levels and costs of crime before treatment, had the greatest amount of crime cost reductions in the year after treatment, and yielded the greatest net benefits. Cost-benefit ratios for both treatment modalities provided evidence of significant returns on treatment investments for cocaine addiction.

**Fox, K., Merrill, J. C., Chang, H., & Califano, J. A., Jr. (1995). Estimating the costs of substance abuse to the Medicaid hospital care program. *American Journal of Public Health*, 85(1), 48-54.**

The purpose of this study was to develop a model, using the epidemiologic tool of attributable risk, for estimating the cost of substance abuse to Medicaid. Based on prior substance-use and morbidity research, population attributable risks for substance abuse-related diseases were calculated. (These risks measure the proportion of total disease cases attributable to smoking, drinking, and drug use). The risks for each disease were

applied to Medicaid hospital discharges and days on the 1991 National Hospital Discharge Survey that had these diseases as primary diagnoses. The cost of these substance abuse-related days were added to Medicaid hospital costs for direct treatment of substance abuse. More than 60 medical conditions involving 1100 diagnoses were identified, at least in part, as attributable to substance abuse. Factoring these substance abuse-related conditions into hospital costs, 1 out of 5 Medicaid hospital days, or 4 million days, were spent on substance abuse-related care in 1991. In 1994, this would account for almost \$8 billion in Medicaid expenditures. The use of tobacco, alcohol, and drugs contributes significantly to hospital costs. To address rising costs, substance abuse treatment and prevention should be an integral part of any health care reform effort.

**Freeborn, D. K., Beaudet, M. P., Mullooly, J. P., Boehm, R. D., & Brenes, J. (1991). Adolescent chemical dependency treatment in an HMO. *HMO Practice*, 5(2), 44-50.**

HMOs are under increasing pressure to expand benefits and services for treatment of adolescents who abuse alcohol and drugs. Little information exists, however, on these programs. This article describes a comprehensive adolescent chemical dependency treatment program within an HMO and presents data on use, costs, and results. Characteristics of clients were similar to adolescents seen in community treatment programs. Less than 1 percent of the HMO adolescent population sought treatment, and the mean number of outpatient treatment visits was 9.7. The median was between two and three visits, and the mode was one visit. Thirty-four percent of the adolescents required residential treatment, and 65 percent of the adolescents completed the recommended 28-day stay. The additional premium cost per member per month for adolescent chemical dependency treatment was approximately \$0.28. A telephone follow-up survey of a random sample of treated adolescents found that most adolescents had reduced their use of alcohol and drugs and had made improvements in other areas of their lives. Few adolescents, however, met the program's goal of total abstinence.

**French, M. T. (1995). Economic evaluation of drug abuse treatment programs: Methodology and findings. *American Journal of Drug and Alcohol Abuse*, 21(1), 111-135.**

Research has shown that drug abuse treatment can help many individuals. Yet funding is often lacking for treatment because these programs compete for scarce resources with other important and effective social programs. This study shows how drug abuse treatment programs can be made more attractive to decision makers and funding agencies by first highlighting why economic evaluation is a critical component of drug abuse treatment research. Next, an evaluation methodology is presented that can be followed by program staff and researchers. The evaluation methodology includes aspects of cost-and-outcome analysis, cost-effectiveness analysis, and benefit-cost analysis. Methods and findings are then discussed from most of the major economic evaluation studies of drug and alcoholism treatment. Lastly, guidelines for conducting future economic evaluations are presented along with suggestions for how the results can be used for policy purposes and program planning.

**French, M. T. (2000). Economic evaluation of alcohol treatment services. *Evaluation and Program Planning* 23, 27-39.**

A literature review was conducted to examine recent research on economic evaluation studies of alcohol treatment methods, and to identify areas requiring additional research. Findings indicate that day hospital treatment or outpatient services are cost-effective alternatives to inpatient treatment for many alcoholics. For alcoholics who are covered by private health insurance, treatment often results in declining health care costs. Alcoholics Anonymous, though it may be cost-effective, has less favorable substance abuse outcomes and a higher risk of relapse. Methods recently have been developed to estimate the dollar value of treatment outcomes based on such factors as reduced absenteeism, increased productivity, improved health, and avoidance of criminal activity. These have led to a need for a new perspective on selection of alternative treatment approaches and changes in service delivery systems. Recommendations are made for a research agenda and communication of findings to everyone involved in the decision making process.

**French, M. T. (2001). Economic evaluation of alcohol treatment services. In Galanter (Vol. Ed.), *Recent developments in alcoholism: Vol. 15. Services research in the era of managed care* (pp. 209-228). New York: Kluwer Academic/Plenum Publishers.**

The objective of this paper is to summarize and critically review the most recent literature on economic evaluation of alcohol treatment services, identify information gaps, and suggest a research agenda for the future. The focus of the review is research published after 1995, although some of the earlier economic studies are also included. Research findings in the literature provide evidence for the following. First, for many alcoholics, day hospital treatment or even less intensive outpatient services are cost-effective alternatives to inpatient treatment. Second, alcoholism treatment often results in declining health care costs for alcoholics who are covered by private health insurance. Third, though the use of Alcoholics Anonymous (AA) as an alternative to more structured alcohol treatment services may be cost-effective, substance abuse outcomes from AA are sometimes less favorable and the risk of relapse is higher. Fourth, methods have recently been developed to estimate the dollar value of alcohol treatment outcomes such as avoided absenteeism, increased productivity, improved health, and avoided crime. Based on these findings and developments, new treatment approaches and changes in service delivery systems require a fresh perspective on the costs and benefits of alternative treatment services. The findings from economic evaluation studies must be reported in clear and nontechnical terms to an audience of clinicians and politicians so that they can be used in the process of decision making.

**French, M. T., Bradley, C. J., Calingaert, B., Dennis, M. L., & Karuntzos, G. T. (1994). Cost analysis of training and employment services in methadone treatment. *Evaluation and Program Planning*, 17(2), 107-120.**

This paper presents a cost analysis of developing a training and employment program (TEP) at four methadone treatment programs. The cost of operations and the marginal

cost of the TEP component are compared to standard methadone treatment. The analysis estimated the average, fixed and variable costs of the services and compared differences across programs. The marginal cost of TEP services was calculated to be between 3.5 percent and 7.2 percent of the annual treatment cost of the 36 clients per site that received the treatment. The articles suggests that the cost methodology used in this analysis could be used in other research projects and by treatment providers to generate consistent and comparable cost estimates of standard and enhanced substance abuse treatment programs.

**French, M. T., Mauskopf, J. A., Teague, J. L., & Roland, E. J. (1996). Estimating the dollar value of health outcomes from drug-abuse interventions. *Medical Care*, 34(9), 890-910.**

People who abuse drugs suffer from a host of medical problems that impose costs on both the abusers and society as a whole. Drug abuse treatment and other interventions can help alleviate these medical problems, leading to health status improvements for chronic drug users and reduced social costs. The authors' dual purpose here is to (1) propose a theoretically rigorous yet easy-to-apply methodology for estimating the health-related costs of drug abuse and (2) demonstrate the methodology by estimating the potential dollar value of avoiding adverse health consequences as a result of successful drug abuse interventions. The authors' proposed multi-attribute quality-adjusted life year methodology for estimating the value of avoiding morbidity and mortality involves eight steps to be followed sequentially. The framework is based on developing a common unit of well-being (i.e., quality-adjusted life year) that can be applied to all types of health conditions. If all health states can be denominated in this common unit, then the process of valuation is straightforward and consistent across all types of illnesses and diseases. The methodology is relatively inexpensive to execute because the estimation procedures are not complicated technically and the data demands are modest. Also, this approach incorporates elements from several disciplines, including psychology, epidemiology, medicine, and economics. Finally, the proposed methodology is flexible enough to cover a wide range of illnesses and diseases so that consistent and comparable estimates can be generated. The authors estimate the dollar value of avoiding acute hepatitis B, human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS), hypertension, bacterial pneumonia, sexually transmitted diseases, and tuberculosis for a white male aged 32 years. The authors' results illustrate that estimated avoided morbidity values can vary significantly across the range of health consequences associated with drug abuse. At the upper end of the range, the value of avoiding only the morbidity associated with a single case of HIV/AIDS is approximately \$157,811 for the period beginning with transmission of HIV, through late-stage HIV and AIDS, and ending just before death. The authors conclude that people who abuse drugs suffer from many medical problems in addition to their addiction. The proposed approach for estimating the dollar value of avoiding adverse health consequences provides policy analysts, evaluators, and researchers a method to calculate theoretically based benefit estimates for use in a benefit-cost analysis of drug abuse interventions.

**French, M. T., Dunlap, L. J., Zarkin, G. A., McGreary, K. A., & McLellan, A. T. (1997). A structured instrument for estimating the economic cost of drug abuse treatment. The Drug Abuse Treatment Cost Analysis Program (DATCAP). *Journal of Substance Abuse Treatment*, 14(5), 445-455.**

Drug abuse treatment programs need to know the cost of the services they provide. Indeed, continued public and private funding is now being linked to cost and performance measures, and programs can use financial data to improve organizational efficiency. However, one of the dangers of promoting cost studies at treatment programs is that most program staff are not technically prepared to perform a cost analysis and little user-friendly information is available to offer assistance. Furthermore, not all cost methods are consistent, which can lead to noncomparable estimates that are difficult to use for policy or planning purposes. This paper tries to fill this gap in the research literature and provide treatment programs with a much-needed technical assistance tool. Specifically, the authors present a structured and scientifically-based instrument for estimating the economic cost of treatment services. The Drug Abuse Treatment Cost Analysis Program (DATCAP) is described in detail along with a companion instrument to analyze treatment financing; the Drug Abuse Treatment Financing Analysis Program (DATFin). The components of both instruments are outlined and findings from a variety of actual case studies are presented. Lastly, we discuss the DATCAP User's Manual, which will enable individual programs to begin collecting the necessary data and estimating economic costs at their own clinics.

**French, M. T., & Martin, R. F. (1996). The cost of drug abuse consequences: A summary of research findings. *Journal of Substance Abuse Treatment*, 13(6), 453-466.**

The purpose of this article is to provide researchers, clinicians, and policymakers with a common source of published cost estimates for drug abuse consequences. Across the broad range of potential complications associated with drug abuse, some of the cost elements are specific and directly related to drug abuse per se (e.g., drug treatment costs), while other items may be related to drug abuse (e.g., typical emergency room cost ). The results presented here are based on a review of completed and ongoing studies, which include published papers, monographs, conference presentations, working papers, reports, insurance company records, newsletters, and expert judgment. Whenever possible, the authors report an average cost estimate and the range of available estimates. Each cost element is normalized to 1994 dollars. The results are organized by type of cost and are presented in tabular format so that the findings can be easily understood and used.

**French, M. T., & McGeary, K. A. (1997). Estimating the economic cost of substance abuse treatment. *Health Economics*, 6, 539-544.**

Few studies have estimated the economic costs and benefits of substance abuse treatment services. This paper introduces a data collection instrument and method for estimating the economic cost of substance abuse treatment programs. The Drug Abuse Treatment Cost Analysis Program (DATCAP) is based on standard economic principles, and the method

has recently been tested in two drug abuse intervention studies. Findings from case studies at three treatment programs are presented to demonstrate the feasibility and reliability of the instrument. The estimation methods and results can be used by treatment programs for self-evaluation purposes and by researchers who are interested in performing cost-effectiveness or benefit-cost analyses of substance abuse services.

**French, M. T., Roebuck, M. C., McLellan, A. T., & Sindelar, J. L. (2000). Can the treatment services review be used to estimate the costs of addiction and ancillary services? *Journal of Substance Abuse*, 12, 341-361.**

The economic costs of addiction treatment and ancillary services are of great interest to substance abuse treatment providers, researchers, and policymakers. This paper examines whether a widely used treatment evaluation instrument, the Treatment Services Review (TSR), can be used to estimate the costs of addiction and ancillary services. The fifth edition of the TSR (TSR-5) is carefully reviewed and critiqued for cost estimation purposes. Unit cost estimates and sources are presented for most of the service delivery units on the TSR-5, and important missing service measures are identified. A cost analysis method is proposed that is based on data from the TSR. A variety of unit cost estimates are offered so that researchers and practitioners will understand how this financial information is compiled. However, the investigation determined that the TSR-5 is not currently structured for a comprehensive cost analysis of treatment services. The potential benefits and limitations of the TSR-5 as a cost analysis tool are identified and explained. In addition, recommended changes to the TSR-5 are suggested and described. Although not originally developed for economic evaluation purposes, with some modifications and enhancements, the TSR is an instrument that is capable of facilitating an economic cost analysis of addiction treatment and ancillary services. By combining service utilization information from a revised TSR (i.e., TSR-6) with reliable unit cost estimates for those services, future evaluation studies will be able to provide more standardized estimates of the costs of addiction and ancillary services for different types of treatment clients. When joined with outcome data, the TSR-6, along with the proposed cost module, can also be used to determine cost-effectiveness and benefit-cost ratios for subgroups of patients and treatment components.

**French, M. T., Sacks, S., De Leon, G., McKendrick, K., & Staines, G. (1999). Modified therapeutic community for mentally ill chemical abusers: Outcomes and costs. *Evaluation & The Health Professionals*, 22(1), 60-85.**

Several studies have established that the personal and social consequences of substance abuse are extensive and costly. These consequences are frequently compounded by mental illness. Although interventions that target mentally ill chemical abusers (MICAs) present several challenges, the potential benefits of successful interventions are significant. This article presents outcomes and costs of a modified therapeutic community (TC) intervention for homeless MICAs. Outcomes at follow-up are compared with those for a control group of homeless MICAs receiving standard services in a "treatment-as-usual" (TAU) condition. Annual economic costs for the modified TC and the average

weekly cost of treating a single client are estimated. Treatment and other health service costs at 12 months post-baseline are compared for modified TC and TAU clients. The results of this study indicate that, suitably modified, the TC approach is an effective treatment alternative for homeless MICAs, with the potential to be highly cost-effective relative to standard services.

**French, M. T., Salome, H. J., Krupski, A., McKay, J. R., Donovan, D. M., McLellan, A. T., & Durrell, J. (2000). Benefit-cost analysis of residential and outpatient addiction treatment in the State of Washington. *Evaluation Review*, 24(6), 609-634.**

A benefit-cost analysis of full continuum (FC) and partial continuum (PC) care was conducted on a sample of substance abusers from the State of Washington. Economic benefits were derived from client self-reported information at treatment entry and at 9 months post-admission using an augmented version of the Addiction Severity Index (ASI). Average (i.e., per client) economic benefits of treatment from baseline to follow-up for both FC and PC were statistically significant for most variables and in the aggregate. The overall difference in average economic benefit between FC and PC was positive (\$8,053) and statistically significant, favoring FC over PC. The average cost of treatment amounted to \$2,530 for FC and \$1,138 for PC ( $p < .01$ ). Average net benefits were estimated to be \$17,833 (9.70) for FC and \$11,173 (23.33) for PC, with values showing statistical significance ( $p < .05$ ). Results strongly indicate that both treatment options generated positive and significant net benefits to society.

**French, M. T., Zarkin, G. A., Hubbard, R. L., & Rachal, J. V. (1991). Impact of time in treatment on the employment and earnings of drug abusers. *American Journal of Public Health*, 81, 904-907.**

We use data from a longitudinal survey to estimate the effects of time in drug abuse treatment on post-treatment weeks worked and earnings for 2,420 clients in three treatment modalities. The regression analysis shows that time in treatment had a positive and statistically significant impact on these labor market outcomes, but the effects were small for all modalities. Although residential clients experienced the largest relative changes in weeks worked and real earnings, a benefit-cost calculation suggests that additional residential treatment cannot be justified from earnings improvements alone. These results may indicate a need for more employment services while in treatment.

**French, M. T., & Zarkin, G. A. (1992). Effects of drug-abuse treatment on legal and illegal earnings. *Contemporary Policy Issues*, 10(2), 98-110.**

This study uses data from a longitudinal survey of 2,420 drug abusers to examine annual legal and illegal earnings. The data came from TOPS, a longitudinal, large-scale study of 11,000 drug abusers who entered treatment in 1979, 1980, and 1981 at 41 selected drug treatment programs. The sample for the study included all clients who took part in the 12-month follow-up interview. Earnings were determined one year before entering a drug treatment program and one year after leaving the same program. Regression analysis of

the data revealed that the length of time in treatment had a significant positive impact on real legal earnings and a significant negative impact on illegal earnings following methadone treatment and residential treatment. However, the magnitude was small. Although residential clients experienced the largest relative changes in earnings outcome, simply comparing the direct cost of residential treatment with the benefits from improved legal earnings and lower illegal earnings suggests that additional residential treatment is not cost-beneficial.

**French, M. T., Zarkin, G. A., & Bray, J. W. (1995). A methodology for evaluating the costs and benefits of employee assistance programs. *Journal of Drug Issues*, 25, 451-470.**

A methodology for determining the costs and benefits of employee assistance programs (EAP) is described to guide future economic evaluation of EAP. Four components are included in the method: a process description, a cost analysis, an outcomes analysis, and an economic evaluation. The evaluation strategy is meant to be used by employers and other researchers.

**Friedman, S. M., & Singer, M. I. (1993). Hospitalization and incarceration costs of dually diagnosed adults: An argument for intensive outpatient treatment. *Substance Abuse*, 14(1), 53-59.**

The authors describe the extent of hospitalizations and incarcerations of dual diagnosed individuals before their referral to outpatient treatment. They also discuss the fiscal and service implications of these data. Thirty-seven percent of alcoholics and 53 percent of persons with other drug disorders have at least one other psychiatric disorder. Dual diagnosed individuals encounter difficulties in housing, nutrition, social functioning, and access to health/mental health care. Individuals referred to an outpatient treatment program for dual diagnosed adults in Cleveland, OH, between 1988 and 1991 were studied. Admission criteria were a diagnosis of chronic severe mental disability and a history of AOD abuse or dependence. Successful interventions with this group require programs that not only address the deficits for mental illness and the problems resulting from drug use, but also address the impact of prolonged and frequent institutionalizations. Service providers need to be familiar with the criminal justice system; arrests and indictments on criminal charges should not be the basis for rejection from a program.

**Garnick, D. W., Horgan, C. M., Hendricks, A. M., & Comstock, C. (1996). Using health insurance claims data to analyze substance abuse charges and utilization. *Medical Care Research and Review*, 53 (3), 350-368.**

The article evaluates the utility of health insurance data sets in providing robust answers to significant research questions. The authors use itemized claims from three large employers to analyze costs to employers, utilization of services to treat abuse of specific drugs, and the effects of managed care strategies. The article concludes that insurance claims data can be used to report employers' payments for treatment of identified



substance abusers and for tracking changes over time but are not useful for studies of the use of treatment for specific drugs.

**Gerson, L. W., Boex, J., Hua, K., Liebelt, R. A., Zumbar, W. R., Bush, D., & Givens, C. (2001). Medical care use by treated and untreated substance abusing Medicaid patients. *Journal of Substance Abuse Treatment*, 20, 115-120.**

Medicaid reimbursement costs for county residents at least 18 years old who used a treatment service (n = 1043) and residents who were Medicaid enrollees with a substance abuse diagnosis but who did not receive treatment (n = 2125) were compared. Untreated patients were more likely to be male (47% vs. 39%), white (56% vs. 45%), and older (39.7 yrs. +/- 13 SD vs. 35.5 yrs +/- 10 SD). The average monthly Medicaid costs (\$257) for the untreated were higher in the year prior to identification than were costs (\$207) for the treated. The monthly costs in the six months following identification were \$761 for the untreated and \$373 for the treated. The costs in the next six months returned to near the original for the treated (\$224), while those for the untreated remained higher at \$340. Medicaid enrollees with untreated substance abuse pose a significant cost to the Medicaid system.

**Gerstein, D. R., Harwood, H. J., & Suter, N. (1994). *Evaluating recovery services: The California Drug and Alcohol Treatment Assessment* (Publication No. ADP 94-629). Sacramento, CA: State of California, Health and Welfare Agency, Department of Alcohol and Drug Programs.**

The cost of treating approximately 150,000 participants represented by the CALDATA study sample in 1992 was \$209 million. Each day of treatment paid for itself on the day it was received, primarily through an avoidance of crime. The benefits of alcohol and other drug treatment outweighed the costs of treatment by ratios from 4:1 to greater than 12:1, depending on the type of treatment. Benefits after treatment persisted through the second year of follow-up for the limited number of participants followed for as long as two years. This suggests that projected cumulative lifetime benefits of treatment will be substantially higher than the shorter-term figures. The level of criminal activity declined by two-thirds from before treatment to after treatment. The greater the length of time spent in treatment, the greater the percentage of reduction in criminal activity. Declines of approximately two-fifths also occurred in the use of alcohol and other drugs from before treatment to after treatment. Approximately one-third reductions in hospitalizations were reported from before treatment to after treatment. For each type of treatment studied, there were slight or no differences in effectiveness based on gender, age, or ethnicity. Overall, treatment did not have a positive effect on the economic situation of the participants during the study period.

**Gold, M. R., Russell, L. B., Siegel, J. E., & Weinstein, M. C. (Eds.). (1996). *Cost-effectiveness in health and medicine*. New York: Oxford University Press.**

This book describes recommendations for the reporting of cost-effective analyses (CEAs) intended to improve the quality and accessibility of CEA reports. The Panel on Cost-Effectiveness in Health and Medicine, a nonfederal panel with expertise in CEA, clinical medicine, ethics, and health outcomes measurement, convened by the US Public Health Service. The panel reviewed the theoretical foundations of CEA, current practices, alternative methods, published critiques of CEAs, and criticisms of general CEA methods and reporting practices. The panel developed recommendations through 2.5 years of discussions. Comments on preliminary drafts were solicited from federal government methodologists, health agency officials, and academic methodologists. These recommendations are proposed to enhance the transparency of study methods, assist analysts in providing complete information, and facilitate the presentation of comparable cost-effectiveness results across studies. Adherence to reporting conventions and attention to providing information required to understand and interpret study results will improve the relevance and accessibility of CEAs.

**Goodman, A. C., Holder, H. D., & Nishiura, E. (1991). Alcoholism treatment offset effects: A cost model. *Inquiry*, 28, 168-178.**

Alcoholism treatment (AL) changes usage and/or spending on non-alcoholism treatment (NA). Yet there has been little economic analysis of the effect of AL on individuals' uses of health services and total health care costs. The authors' model yields both cost and usage impacts. A 1 percent increase in short-term AL events implies a 1.9 percent increase in costs; subsequent AL increases costs by .6 percent. A 1 percent increase in short-term NA events implies a 1.3 percent increase in costs; subsequent NA increases costs by 1.5 percent. Initiation of AL directly lowers NA, but indirectly increases NA usage (and hence, costs) in subsequent treatment. Overall, a 10 percent increase in AL leads to a 9.2 percent increase in health care costs.

**Goodman, A. C., Holder, H. D., Nishiura, E., & Hankin, J. R. (1992). An analysis of short-term alcoholism treatment cost functions. *Medical Care*, 30 (9), 795-809.**

A number of alcohol treatment studies have documented variations in the average cost of treating alcoholics. However, these studies have provided little explanation for these variations. In this study, three major issues in the measurement of alcoholism treatment costs are investigated: 1) choice of treatment location, i.e., inpatient versus outpatient; 2) interaction of treatment locations in the estimation of costs; 3) impact of type of alcohol problem and comorbidities on treatment costs. The study includes an integrated framework that jointly estimates treatment location and treatment costs conditional on treatment location, concentrating on short-term alcoholism treatment and using insurance claims data to specify a 6-month period beginning with each individual's first treatment for alcoholism. The different treatment types subsumed in the categories alcohol abuse and alcohol dependence are also addressed. Results indicate that comorbidities are crucial

in determining treatment location. Once treatment location is determined, however, their effects on treatment costs, while measurable, are statistically insignificant. Partial treatment effects, conditional on treatment location, differ substantially from full treatment effects, which are determined jointly with treatment location.

**Goodman, A. C., Nishiura, E., Hankin, J. R., Holder, H. D., & Tilford, J. M. (1996). Long-term alcoholism treatment costs. *Medical Care Research and Review*, 53(4), 441-464.**

This study seeks to provide a model for the estimation of long-term alcoholism treatment costs using insurance claims data. The integrated analysis considers the decision to seek alcoholism treatment, treatment location (inpatient or outpatient), and treatment costs conditional on treatment location. The probability of long-term treatment depends on the initial diagnosis (alcohol abuse or alcohol dependence), the presence of a comorbidity, and the short-term treatment.

**Goodman, A. C., Nishiura, E., & Humphreys, R. S. (1997). Cost and usage impacts of treatment initiation: A comparison of alcoholism and drug abuse treatment. *Alcoholism: Clinical and Experimental Research*, 21(5), 931-938.**

An extensive literature on substance abuse and mental health treatments suggests that they often lead to decreased usage and/or spending on other medical treatments. Authors compare alcohol and drug abuse treatment costs with a model that decomposes total treatment costs into amount of treatment (outpatient visits or inpatient days) and costs per treatment. The analysis compares alcohol and drug abuse treatment costs regarding: (1) the incremental costs attributable to changed short-term substance abuse and nonsubstance abuse treatments; (2) the impacts of current substance abuse treatments on short-term nonsubstance abuse, long-term substance abuse, and long-term nonsubstance abuse treatments; and (3) the difference in inpatient and outpatient impacts. The findings indicate that alcoholism and drug abuse treatment initiation have similar impacts on coincident and subsequent utilization and costs. For both treatments, the largest portions of the cost impacts occur for inpatient treatments, and for treatments that occur within 6 months of the initiation. The similarity of results suggests that it may often be reasonable to infer utilization and cost impacts for one type of care from studies that examine the other.

**Goodman, A. C., Nishura, E., & Hankin, J. (1998). Short term drug abuse treatment costs and utilization: A multi-employer analysis. *Medical Care*, 36(8), 1214-1227.**

This report investigates three aspects of drug abuse treatment costs, with special emphasis on systematic differences among employers: (1) predictors of drug abuse treatment costs; (2) differentials in drug abuse treatment costs across employers; and (3) differential impacts of patient and employer characteristics on drug abuse treatment costs. The study used multiple regression analysis of behavioral cost functions. It decomposed cost differences into employer and variable effects using an algebraic method that accounted for differences in cost functions and in population characteristics. An insurance claims

database was used from 10 large self-insured employers for a 3-year period starting January 1989. Marginal inpatient costs generally exceeded average costs, leading to slightly increasing costs per day as length of stay increased. Marginal outpatient costs were generally about the same as average costs, implying that outpatient drug treatment maintained constant unit costs as utilization increased. Decomposition of cost differences among employers suggested that observed differences among employers and/or their carriers (who administer the benefits for the self-insured employers) and providers appeared to be at least as important as differences among the characteristics or the utilization of the people that they cover. The authors conclude that national health policies aimed at reducing costs are likely to have differing impacts on different employers. Employers with high costs relative to the characteristics of their covered population may be able to achieve significant cost savings. Employers serving populations with greater risk factors may find it difficult to cut costs further.

**Goodman, A. C., Tilford, J. M., Hankin, J. R., Holder, H. D., & Nishiura, E. (2000). Alcoholism treatment offset effects: An insurance perspective. *Medical Care Research and Review*, 57(1), 51-75.**

This study investigates whether alcoholism treatment costs are offset by reductions in other medical treatment costs by comparing people treated for alcoholism with a matched comparison group. The alcoholism treatment group is defined by diagnoses of alcohol dependence, abuse, or psychoses from health insurance claims between January 1980 and June 1987. A comparison sample was matched on age, gender, and insurance coverage. In this primarily methodological study, expected costs for nonalcoholism treatments were calculated from standardized regressions. Offset effects were measured from the insurer's perspective through differences in expected total nonalcoholism treatment costs in the periods preceding and following alcoholism treatment. Members of the alcoholism treatment group were more likely than the comparison group to be hospitalized and to need other (nonalcoholism) medical treatment, thus incurring higher total costs. Offset effects emerged for patients with alcohol abuse and without mental psychosis comorbidities.

**Griffith, J. D. (2000). Prison-based substance abuse treatment, residential aftercare, and risk classification: A cost-effectiveness analysis. *Dissertation Abstracts International: Section B: The Sciences & Engineering*, 60(11B), 5573. (University Microfilms No. AAI9952367).**

This paper is a cost-effectiveness analysis of the treatment of drug-involved offenders based on an outcome of 1- and 3-year recidivism rates. Comparisons were drawn between those receiving in-patient treatment and those untreated, those who completed a community-based transitional therapeutic community following release in addition to the 9-month in-prison therapeutic treatment and those who only completed the in-prison treatment, and groups with varying risk classifications. Findings showed that the complete course of treatment is highly cost-effective, particularly for those who are high-risk.

**Hartz, D. T., Meek, P., Piotrowski, N. A., Tusel, D. J., Henke, C. J., Delucchi, K., Sees, K., & Hall, S. M. (1999). A cost-effectiveness and cost-benefit analysis of contingency contracting-enhanced methadone detoxification treatment. *American Journal of Drug and Alcohol Abuse*, 25(2), 207-218.**

This study examined treatment costs in an ongoing study in which 102 opioid-addicted patients had been randomly assigned to either 180-day methadone detoxification or the same treatment enhanced with contingency contracting. In the latter condition, study participants received regular reinforcers contingent on negative urine toxicology screens and breath analyses for a range of drugs and alcohol. Both conditions involved psychosocial treatment, and all participants were stabilized to a daily methadone dose of approximately 80 mg during the first 4 months, followed by a 2-month taper. Individuals participating in the enhanced condition were more likely to provide continuously drug-free urine samples and alcohol-free breath samples during the final month of treatment than were participants in the control condition. Cost of treatment was calculated individually for each participant based on actual services received. First, unit cost for each service was determined, including adjusted staff salaries for direct treatment and opportunity cost of facilities utilized during service delivery. Next, the authors valued each patient's use of services during the first 120 days of the study and then added the cost of methadone, laboratory work, and contingent reinforcers. A subsample (n = 45) also provided data on health care utilization during treatment, which the authors valued using standard Medicare unit costs. The marginal cost of enhancing the standard treatment with contingency contracting was approximately 8%. An incremental cost of \$17.27 produced an additional 1% increase in the number of participants providing continuously substance-free urine and breath samples during month 4 of the study. For every additional dollar spent on treatment, a \$4.87 health care cost offset was realized; however, this difference was statistically insignificant due to extreme variances and small subsample size.

**Harwood, H. (1999). *Adding "value" to CSAT demonstrations: The what, how, and why of cost analysis*. (NEDTAC Contract No. 270-94-0001). Falls Church, VA: The Lewin Group.**

This document discusses the evolution of the importance of cost in the substance abuse treatment system and the need to conduct cost analysis when evaluating substance abuse treatment services. It presents three cost-analysis strategies (cost analysis, cost-effectiveness analysis, and cost benefit analysis) for CSAT demonstration treatment service providers and shows how CSAT's "Uniform System of Accounting and Cost Reporting for Substance Abuse Treatment Providers" can be used to develop cost analysis data.

**Harwood, H., Fountain, D., Carothers, S., Gerstein, D., & Johnson, R. (1998). Gender differences in the economic impacts of clients before, during and after substance abuse treatment. *Drugs and Society*, 13(1-2), 251-269**

The cost of treatment and the outcomes of men and women from a publicly-supported California treatment system are described in this article. The article concludes that the treatment of women is highly cost-beneficial, but that cost-benefit ratios are materially lower among women than men in some modalities. Women posed a lesser economic burden than men in the year leading up to treating, due mostly to lower criminal involvement. Women tended also to be treated in outpatient rather than residential or inpatient settings. Treatment of men and women resulted in economic savings four to twelve times greater than the cost of treatment, depending on modality. Regardless of treatment setting, total savings during treatment and in the year following exceeded costs for both men and women.

**Harwood, H. J., Hubbard, R. L., Collins, J. J., & Rachal J. V. (1988). The costs of crime and the benefits of drug abuse treatment: A cost-benefit analysis using TOPS data. In C.G. Leukefeld, & F.M. Tims (Eds.), *Compulsory treatment of drug abuse: Research and clinical practice*. (NIDA Research Monograph No. 86, pp. 209-235), Rockville, MD: National Institute on Drug Abuse.**

This study estimates the relative economic benefits of outpatient methadone, residential, and outpatient drug-free drug treatment units in terms of reduction of drug users' criminal activity. Regression analyses examined correlates between the average cost per treatment day and the reduction in crime-related costs during the year following discharge from treatment. Other variables included in the model include economic benefit from increased length of stay, the effects of previous treatment episodes, pretreatment involvement in crime, and criminal justice system involvement at entry into treatment.

**Harwood, H., Kallinis, S., & Liu, C. (2001a). The cost and components of substance abuse treatment (NEDS Contract No. 270-97-7016). Falls Church, VA: The Lewin Group.**

This technical report introduces a tool developed for CSAT to analyze the cost of substance abuse treatment services. It was developed by cost accountants for use related to substance abuse treatment evaluations. It has been extensively tested on the full variety of provider types. This report describes the approach and methods of this tool, and provides a basic understanding of why and when this (or a similar) tool should be considered for use.

**Harwood, H., Kallinis, S., & Liu, C. (2001b). *Do larger residential service delivery units have lower costs?* (NEDS Contract No. 270-97-7016). Falls Church, VA: The Lewin Group.**

This analytic report presents the results of an analysis of the relationship between the size of providers and the cost of delivering treatment services. It was found that large

providers tend to have lower costs per unit of service than small providers, although it appears that this may be partially due to delivery of lower intensity services, with uncertain implications for the outcomes of care.

**Harwood, H., & Koenig, L. (2000). Cost-offsets of correctional and community drug abuse treatment. *Trends in Evidence-based Neuropsychiatry*, 2(10), 48-53.**

The economic benefits and costs of correctional and community-based drug treatment are analyzed for 71 publicly funded providers and 4,411 clients. The human capital approach is used to value health care, crime, and employment impacts of drug addicts in the year before admission and following discharge. Benefits (measured as the change in adverse impacts from before to after treatment) were about 15-fold greater than costs for correctional treatment (\$15,600 vs \$1,060) and about two-times greater for community treatment (\$7,900 vs \$3,700), with different ratios for various types of treatment. Over 90 percent of the economic benefits were related to reductions in crime-related costs. Only modest improvements in health costs and earnings were achieved. These estimates do not include benefits realized during treatment or more than two years after treatment discharge. Moreover, about 35 percent of the clients returned to treatment within one year of discharge.

**Hayashida, M., Alterman, A. I., McLellan, A. T., O'Brien, C. P., Purtill, J. J., Volpicelli, J. R., Rhaephelson, A. H., & Hall, C. P. (1989). Comparative effectiveness and costs of inpatient and outpatient detoxification of patients with mild-to-moderate alcohol withdrawal syndrome. *The New England Journal of Medicine*, 320(6), 358-365.**

The effectiveness, safety, and costs of outpatient (n = 87) and inpatient (n = 77) detoxification from alcohol were compared in a randomized, prospective trial involving 164 male veterans of low socioeconomic status. The outpatients were evaluated medically and psychiatrically and then were prescribed decreasing doses of oxazepam on the basis of daily clinic visits. The inpatient program combined comprehensive psychiatric and medical evaluation, detoxification with oxazepam, and the initiation of rehabilitation treatment. The mean duration of treatment was significantly shorter for outpatients (6.5 days) than for inpatients (9.2 days). On the other hand, significantly more inpatients (95 percent) than outpatients (72%) completed detoxification. There were no serious medical complications in either group. Outcome evaluations completed at one and six months for 93 and 85 percent of the patients, respectively, showed substantial improvement in both groups at both follow-up periods. At one month there were fewer alcohol-related problems among inpatients and fewer medical problems among outpatients. However, no group differences were found at the six-month follow-up, nor were differences found in the subsequent use of other alcoholism treatment services. Costs were substantially greater for inpatients (\$3,319 to \$3,665 per patient) than for outpatients (\$175 to \$388). The authors concluded that outpatient medical detoxification is an effective, safe, and low-cost treatment for patients with mid-to-moderate symptoms of alcohol withdrawal.

**Holder, H. D. (1987). Alcoholism treatment and potential health care cost saving. *Medical Care*, 25(1), 52-71.**

In 1979 *Medical Care* published a supplement that summarized and evaluated existing research on changes in health care patterns associated with mental health, alcoholism, and drug abuse treatment. This paper, limited to alcoholism treatment, reviews research that has been completed since the 1979 supplement. Considerations of appropriate research methods are discussed, recent studies that have employed a variety of research approaches are reviewed and evaluated, overall findings are summarized, implications and conclusions that can be drawn about offset are discussed, and recommendations for future research are made. These studies have fewer methodologic limitations and utilize larger study groups and longer follow-up periods than did earlier studies. They confirm earlier findings that general health care utilization and costs drop after initiation of alcoholism treatment.

**Holder, H. D. (1998). The cost offsets of alcoholism treatment. In Galanter (Vol. Ed.), *Recent developments in alcoholism, vol. 14. The consequences of alcoholism* (pp. 361-374). New York: Plenum Press.**

While the effectiveness of alcoholism treatment is an important concern in alcohol research, the cost of such treatment and its benefits are also important research matters. There is substantial research that examines the possible benefits of alcoholism treatment in reducing the cost of all medical care, including the cost of alcoholism treatment itself. This is referred to as cost offsets. This chapter reviews the research evidence of alcoholism treatment cost offset, that is, the ability of alcoholism treatment to reduce the cost of medical care of persons participating in such treatment. The chapter gives an overview summary of the cost offset findings for alcoholism treatment and concludes with an identification of future research needs and opportunities, especially surrounding the popular increase in the use of managed care.

**Holder, H. D., & Blose, J. O. (1986). Alcoholism treatment and total health care utilization and costs: A four-year longitudinal analysis of federal employees. *Journal of American Medical Association*, 256(11), 1456-60.**

This study examines the effect of alcoholism treatment services on overall health care utilization and costs for health insurance enrollees under the Federal Employees Health Benefit Program with Aetna Insurance Company, 1980 through 1983. Claims filed by 1697 treated alcoholics (and their family members) continuously enrolled with Aetna during the study period were examined. In the years prior to initial alcoholism treatment, alcoholics incurred gradually increasing total health care costs on the average. These costs rose dramatically in the six months prior to treatment, began to decline after treatment initiation, and continued to fall during several follow-up years. For alcoholics less than 45 years of age, costs eventually declined to a point comparable with the lowest pretreatment levels.



**Holder, H. D., & Blose, J. O. (1991). Typical patterns and cost of alcoholism treatment across a variety of populations and providers. *Alcoholism: Clinical and Experimental Research*, 15, 190-195.**

This paper presents data on the utilization of alcoholism treatment services in three populations of insurance enrollees: enrollees covered by the insurance plan of a large midwestern manufacturing firm, 1981-1987 (N = 1,425); enrollees of the California Health Insurance Plan of the Public Employees Retirement System, 1974-1976 (N = 766); U.S. government civilian employees enrolled with the Aetna Insurance Company, 1980-1983 (N = 1,697). The average age of the treated alcoholics in these three groups ranged from 37 to 51. Between two-thirds and three-quarters were male. Inpatient alcoholism treatment services were more frequently used than outpatient, with inpatient admissions averaging between 1.2 and 1.5 per person. For enrollees of the midwestern manufacturing firm, total alcoholism treatment costs averaged \$4,665 per person (December 1985 dollars). The influence of insurance plan coverage and other factors on utilization patterns is discussed.

**Holder, H. D., & Blose, J. O. (1992). The reduction of health care costs associated with alcoholism treatment: A 14-year longitudinal study. *Journal of Studies of Alcohol*, 53(4), 293-302.**

This study utilized two separate research designs to examine whether the initiation of alcoholism treatment is associated with a change in overall medical care cost in a population of alcoholics enrolled under a health plan sponsored by a large midwestern manufacturing corporation. In the longest longitudinal study of alcoholism treatment costs to date, a review of claims filed from 1974 to 1987 identified 3,729 alcoholics (3,068 of whom received treatment and 661 of whom did not). In one design, a time-series analysis found that following treatment initiation the total health care costs of treated alcoholics--including the cost of alcoholism treatment --declined by 23 percent to 55 percent from their highest pretreatment levels. Costs for identified but untreated alcoholics rose following identification. In a second design, analysis of variance was used to control for group differences including pretreatment health status and age. This analysis indicated that the posttreatment costs of treated alcoholics were 24 percent lower than comparable costs for untreated alcoholics. The study provides considerable evidence that alcoholism treatment can reduce overall medical costs in a heterogeneous alcoholic population (white collar/blue collar; fee-for-service/HMO).

**Holder, H. D., Cisler, R. A., Longabaugh, R., Stout, R. L., Treno, A. J., & Zweben, A. (2000). Alcoholism treatment and medical care costs from Project MATCH. *Addiction*, 95(7), 999-1013.**

This paper examines the costs of medical care prior to and following initiation of alcoholism treatment as part of a study of patient matching to treatment modality. The study was a longitudinal study with pre- and post-treatment initiation. The total medical care costs for inpatient and outpatient treatment were measured for patients participating over a span of 3 years post-treatment at three treatment sites at two of the nine Project MATCH locations (Milwaukee, WI and Providence, RI). Two hundred and seventy-nine patients were randomly assigned to one of three treatment modalities: a 12-session cognitive behavioral therapy (CBT), a four-session motivational enhancement therapy (MET) or a 12-session Twelve-Step facilitation (TSF) treatment over 12 weeks. Total medical care costs declined from pre- to post-treatment overall and for each modality. Matching effects independent of clinical prognosis showed that MET has potential for medical-care cost-savings. However, patients with poor prognostic characteristics (alcohol dependence, psychiatric severity and/or social network support for drinking) have better cost-savings potential with CBT and/or TSF. The authors concluded that matching variables have significant importance in increasing the potential for medical-care cost-reductions following alcoholism treatment.

**Holder, H. D., & Cunningham, D. W. (1992). Alcoholism treatment for employees and family members: Its effect on health care costs. *Alcohol Health & Research World*, 16(2), 149-153.**

Whether or not alcoholic workers are treated, they contribute to increased health care utilization and therefore to associated costs. The employer pays for these increased costs through higher overall health insurance premiums and higher direct care costs. If treatment of alcoholism, even with its additional cost, can contribute to lower total long-term health care costs, then treatment is a good investment for employers. The cumulative evidence of studies based on employees and members of their families has revealed a decline in overall health care costs following alcoholism treatment. Alcoholics generally are less productive, incur more absences, and create more problems as employees. There are two main problems with using termination as a solution: (1) collective-bargaining agreements with labor unions might proscribe termination based on alcoholism, and (2) many alcoholic workers are highly skilled, and their termination might represent a significant loss in terms of the training and performance of replacements. Recovery, even with occasional relapses, may be a less expensive alternative to new hiring and training.

**Holder, H. D., & Hallan, J.B. (1981). Medical care and alcoholism treatment costs and a five-year analysis of the California Pilot Project to provide health insurance coverage for alcoholism (NIAAA, pp. 57). Rockville, MD: National Institute of Alcohol Abuse and Alcoholism.**

This study reported the findings from the analysis of enrollees in two Kaiser health plans and California Western Occidental (CWO) after a state pilot program to provide alcoholism benefits ended. Treatment is administered on an increasingly outpatient rather than inpatient basis. The study also discovered that creating a uniform, comprehensive set of insurance benefits for alcoholism treatment is inexpensive. Utilization was not excessive, and the rise in insurance premiums needed to fund such treatment was modest.

**Holder, H. D., & Hallan, J. B. (1986). Impact of alcoholism treatment on total health care costs: A six-year study. *Advances in Alcohol & Substance Abuse*, 6(1), 1-15.**

This is a six-year longitudinal study to determine if the treatment of alcoholism as a primary diagnosis results in a reduction of total health care cost and/or utilization for the alcoholic as well as other nonalcoholic family members. All health care costs and utilization were tracked for a group of 90 families, representing 245 individuals, enrolled with Blue Cross/Blue Shield through the Health Benefits Division, California Public Employees Retirement System. At least one member in each family received treatment under a specific diagnosis of alcoholism from July 1, 1974 to December 1, 1975. All health care utilization and costs were obtained for a 12-month period before initial treatment for alcoholism and up to July 1, 1979. In addition, a matched group of 83 comparison families with no alcoholic members and covering 291 persons was selected to reflect family composition, age, and sex. Total health care data were obtained over the same time period for these families. The results indicated that utilization and costs of all forms of inpatient care for both nonalcoholic family members as well as alcoholic family members dropped after alcoholism treatment began and ultimately reached a level similar to the matched comparison group. On the average, outpatient care also decreased in terms of frequency and costs for all members of the alcoholic's family; and in similar fashion converged in the fourth follow-up period to the matched comparison families. Total health care costs per family member decreased substantially over time following initiation of treatment of the alcoholic family member. The findings support the contention that the direct treatment of alcoholism can yield significant reductions in total health care costs and utilization not only for the alcoholic but his/her family members as well.

**Holder, H. D., Lennox, R. D., & Blose, J. O. (1992). The economic benefits of alcoholism treatment: A summary of twenty years of research. *Journal of Employee Assistance Research*, 1(1), 63-82.**

This paper reviews more than 20 years of research into the potential total health care cost savings associated with alcoholism treatment. This research has found consistent savings associated with treatment, findings which have been replicated in a variety of employment settings and with a number of research designs and analytical strategies. In

general, research has shown that untreated alcoholics use health care at twice the rate of their age/gender cohort, that this difference can be closed after alcoholism treatment is initiated, and that younger problem drinkers have a much better prognosis for cost savings than older problem drinkers. No differences were found by gender. The paper concludes with a discussion of the implications of this research for employee assistance programs (EAPs).

**Holder, H., Longabaugh, R., Miller, W. R., & Rubinis, A. V. (1991). The cost effectiveness of treatment for alcoholism: First approximation. *Journal of Studies in Alcoholism*, 52(6), 517-540.**

This study undertakes an analysis of cost effectiveness of alcoholism treatment modalities based upon (1) findings from clinical trials, (2) costs for treatment in settings and/or by providers and (3) recommendations from treatment experts about appropriate settings, providers and treatment events. This analysis, which assumes a prototypic patient, suggests that modalities with the most evidence of effectiveness (based on three or more clinical trials) are not the most expensive. Within this study, total cost of care was negatively related to effectiveness. Modalities categorized as having insufficient evidence of effectiveness (i.e., lacking three or more clinical trials) are in the higher cost categories. The results of this first effort to establish initial cost/effectiveness considerations are intended to stimulate researchers to conduct the types of clinical studies where both cost and effectiveness are carefully measured to increase the scientific basis for future cost/effect policy considerations. The authors expect future clinical studies will revise the results of this initial effort.

**Holder, H. D., & Shachtman, R. H. (1987). Estimating health care savings associated with alcoholism treatment. *Alcoholism: Clinical and Experimental Research*, 11(1), 66-73.**

The goal of the paper was to develop alternative estimates of total health care cost savings or the offset which is associated with alcoholism treatment. The paper utilized the pretreatment general health care costs from a national study of alcoholics and a variety of statistical models to develop a range of offset estimates. The data utilized came from health records of alcoholic patients enrolled with the Federal Employee Health Benefits Program (FEHBP) with the Aetna Insurance Company. The study included 1645 patients from all 50 states continuously enrolled under FEHBP from 1980-1983. Results showed that offset savings by the end of the third year after initial alcoholism treatment were estimated to be from \$400 to over \$900, depending upon the assumptions of the predicting model. The model estimates employing two different techniques were from \$2500 to \$3700.

**Howard, M. O., & Jenson, J. M. (1990). Chemical aversion treatment of alcohol dependence. I. Validity of current criticisms. *The International Journal of the Addictions*, 25(10), 1227-1262.**

Criticisms of chemical aversion therapy are delineated and their validity assessed. Data pertaining to the effectiveness, acceptability, intrusiveness, availability of alternative treatments, cost-effectiveness, and theoretical foundations of chemical aversion therapy are examined. It is concluded that available evidence supports the efficacy of chemical aversion therapy with respect to production of conditioned aversion to alcohol and treatment outcome.

**Hser, Y., & Anglin, M. D. (1991). Cost-effectiveness of drug abuse treatment: Relevant issues and alternative longitudinal modeling approaches. In W. S. Cartwright, & J. M. Kaple (Eds.), *Economic costs, cost-effectiveness, financing, and community-based drug treatment*, (NIDA Research Monograph No. 113, pp. 67-93). Rockville, MD: National Institute on Drug Abuse.**

This article presents a conceptual framework by which cost-benefit values are calculated in a straightforward fashion. The framework addresses analysis units, timeframes, and categories of cost-benefit measures. Several topics for future research are suggested.

**Hubbard, R. L., & French, M. T. (1991). New perspectives on the benefit-cost and cost-effectiveness of drug abuse treatment. In W. S. Cartwright, & J. M. Kaple (Eds.), *Economic costs, cost-effectiveness, financing, and community-based drug treatment*, (NIDA Research Monograph No. 113, pp. 94-113). Rockville, MD: National Institute on Drug Abuse.**

The authors suggest in this methodological study that current research on the cost of substance abuse treatment needs to be revised to include considerations of stage of treatment, components of treatment structure and process, and the typology of client impairment. The proposed framework in the article is drawn in part from psychotherapy models.

**Hughey, R., & Klemke, L. W. (1996). Evaluation of a jail-based substance abuse treatment program. *Federal Probation*, 60(4), 40-44.**

The Inmate Recovery Program is a 5-week treatment program in jail facilities. It uses a day treatment model and has an outpatient component for individuals after they complete the jail-based program. Inmates typically spend 5 hours a day for 5 days a week during the jail-based portion of the program. Up to 12 inmates are allowed into each treatment group. Each client also receives one individual therapy session each week. Alcoholics Anonymous and Narcotics Anonymous meetings take place each week during evening hours and are typically conducted by non-inmate volunteers. The evaluation compared the arrest and incarceration records of inmates going through the program to their records after completing the program, inmates who completed the program and the small number

who did not successfully finish, and a matched control group of untreated inmates with drug abuse problems. Results indicated that this program produced lower rates of recidivism among program completers than in those who did not take part. The program expenses were modest. Finally, the day-treatment approach is flexible and adaptable to a variety of correctional facilities.

**Humphreys, K., & Moos, R. H. (1996). Reduced substance-abuse-related health care costs among voluntary participants in Alcoholics Anonymous. *Psychiatric Services*, 47(7), 709-713.**

This study examined differences in outcomes, alcoholism treatment utilization, and costs between alcoholic individuals with no previous treatment history who chose to attend Alcoholics Anonymous (AA) and those who seek help from a professional outpatient alcoholism treatment provider. Participants in this three-year prospective study were recruited at alcoholism information and referral services and at detoxification units in the San Francisco Bay Area. Chi square and t tests and repeated-measures analyses of variance were used to examine data gathered from interviews with 201 participants at baseline and at one and three years. At baseline, participants who chose to attend AA meetings (N = 135) were not significantly different from those who chose professional outpatient treatment (N = 66) in sex, marital status, employment, race, and symptoms of alcohol dependence and depression. However, AA attendees had lower incomes and less education and experienced more adverse consequences of drinking at baseline than did those who sought outpatient care, suggesting somewhat worse prognoses for the AA group. Over the three-year study, per-person treatment costs for the AA group were 45 percent (or \$1,826) lower than costs for the outpatient treatment group. Despite the lower costs, outcomes for the AA group at both one and three years were similar to those of the outpatient treatment group. The authors conclude that voluntary AA participation may significantly reduce professional treatment costs. Clinicians, researchers, and policymakers should recognize the potential health care cost offsets offered by AA and other self-help organizations.

**Humphreys, K., & Moos, R. H. (2001). Can encouraging substance abuse patients to participate in self-help groups reduce demand for health care? A quasi-experimental study. *Alcoholism: Clinical and Experimental Research*, 25(5), 711-716.**

Twelve-step-oriented inpatient treatment programs emphasize 12-step treatment approaches and the importance of ongoing attendance at 12-step self-help groups more than do cognitive-behavioral (CB) inpatient treatment programs. This study evaluated whether this difference in therapeutic approach leads patients who are treated in 12-step programs to rely less on professionally provided services and more on self-help groups after discharge, thereby reducing long-term health care costs. A prospective, quasi-experimental comparison of 12-step-based (N = 5) and cognitive-behavioral (n = 5) inpatient treatment programs was conducted. These treatments were compared on the degree to which their patients participated in self-help groups, used outpatient and inpatient mental health services, and experienced positive outcomes (e.g., abstinence) in

the year following discharge. Using a larger sample from an ongoing research project, 887 male substance-dependent patients from each type of treatment program were matched on pre-intake health care costs (N = 1,774). At baseline and 1-year follow-up, patients' involvement in self-help groups (e.g., Alcoholics Anonymous), utilization and costs of mental health services, and clinical outcomes were assessed. Compared with patients treated in CB programs, patients treated in 12-step programs had significantly greater involvement in self-help groups at follow-up. In contrast, patients treated in CB programs averaged almost twice as many outpatient continuing care visits after discharge (22.5 visits) as patients treated in 12-step treatment programs (13.1 visits), and also received significantly more days of inpatient care (17.0 days in CB versus 10.5 in 12-step), resulting in 64 percent higher annual costs in CB programs (\$4,729/patient,  $p < 0.001$ ). Psychiatric and substance abuse outcomes were comparable across treatments, except that 12-step patients had higher rates of abstinence at follow-up (45.7% percent versus 36.2% for patients from CB programs,  $p < 0.001$ ). The authors conclude that professional treatment programs that emphasize self-help approaches increase their patients' reliance on cost-free self-help groups and thereby lower subsequent health care costs. Such programs therefore represent a cost-effective approach to promoting recovery from substance abuse.

**Jerrell, J. M., & Hu, T. (1996). Estimating the cost impact of three dual diagnosis treatment programs. *Evaluation Review*, 20(2), 160-180.**

Specialized intervention programs for people with concurrent severe mental illness and substance abuse reduce the total costs of care. Compared to baseline, cost savings of over 40 percent were achieved by 18 months, primarily due to significant reductions in the use of acute and subacute mental health services and despite an increase in outpatient mental health services. There also was an observable impact on cost reductions in medical and criminal justice services without an increase in family costs over the same time period.

**Kashner, T. M., Rodell, D. E., Ogden, S. R., Guggenheim, F. G., & Karson, C. N. (1992). Outcomes and costs of two VA inpatient treatment programs for older alcoholic patients. *Hospital and Community Psychiatry*, 43(10), 985-989.**

One hundred thirty-seven older alcoholic patients were randomly assigned to two different inpatient treatment programs at a Veterans Affairs medical center and followed for one year after discharge. The older alcoholic rehabilitation (OAR) program was operated by a tolerant staff that specialized in treating elderly alcoholics. Treatment included reminiscence therapy with goals of developing patient self-esteem and peer relationships. The traditional care program emphasized confrontation to focus on patients' past failures and present conflicts. Patient care costs were slightly lower (2.5 percent lower) in the OAR program than in the more traditional program, and OAR patients were 2.1 times more likely to report abstinence at one year. Response to the OAR program was best for patients over 60 years of age.

**Koenig, L., Denmead, G., Nguyen, R., Harrison, M., & Harwood, H. (1999). *The costs and benefits of substance abuse treatment: Findings from the national treatment improvement evaluation study (NTIES)*. (NEDS Contract No. 270-97-7016). Falls Church, VA: The Lewin Group.**

This analytic report, using NTIES data, examines the estimated costs and benefits that accrue as the result of substance abuse treatment, distinguishing between benefits to society and benefits to the non-treated population. Findings indicate that the total benefits of substance abuse treatment in terms of avoided health care, welfare, SSI, and crime-related costs and increased earnings far exceeded the cost of treatment. The differences in pre-treatment (baseline) costs and post-treatment (follow-up) costs provided an estimate of the economic impact of substance abuse treatment. This "treatment effect" is viewed as a benefit to the extent that it represents avoided crime-related costs, health-care costs, or welfare payments or increased earnings.

**Koenig, L., Harwood, H. J., Sullivan, K., & Sen, N. (2000a). *Do the benefits of more intensive substance abuse treatment offset the costs?* (NEDS Contract No. 270-97-7016). Falls Church, VA: The Lewin Group.**

This analysis estimated the relationship between treatment intensity and post-treatment societal benefits associated with substance abuse treatment. Analyses explored whether longer length of stay and more frequent individual and group counseling sessions improved societal benefits of treatment, such as reduced costs associated with crime, health care, and welfare; or improvements in client earnings. Regressions were used to explore the societal benefit that accrues with each additional day of treatment or hour of counseling, while controlling for client addiction severity, motivation, and other factors. Longer treatment duration was associated with improved societal benefits for clients in short-term and long-term residential and outpatient non-methadone providers. More frequent counseling was associated with improved societal benefits in short-term hospitals and residential facilities. The authors also discuss the relationship between improved benefits and the associated increase in treatment costs.

**Koenig, L., Harwood, H., Sullivan, K., & Sen, N. (2000b). *The economic benefits of increased treatment duration and intensity in residential and outpatient substance abuse treatment settings*. *Journal of Psychopathology and Behavioral Assessment*, 22(4), 399-417.**

This study presents estimates of the economic benefits to society from community-based substance abuse treatment. The analysis focused on the impact of length of stay and frequency of counseling on clients' crime-related and health care costs, welfare receipts, and income taxes. The results indicate that the benefits from an additional day of treatment were on average \$21 for short-term residential treatment (or 29 percent of the cost of a day of care), \$13 for outpatient drug-free treatment (or 94 percent of the cost of a day of care), and \$5 for long-term residential treatment (or 9 percent of the cost of a day of care). No benefits were found from additional counseling provided by a client's



primary therapist. With the exception of short-term residential care, estimated increases in client earnings from longer lengths of stay exceeded the benefits to society. These estimates do not include benefits realized during treatment or beyond the year after treatment.

**Kraft, M. K., Rothbard, A. B., Hadley, T. R., McLellan, A. T., & Asch, D. A. (1997). Are supplementary services provided during methadone maintenance really cost-effective? *American Journal of Psychiatry*, 154(9), 1214-1219.**

Previous research has suggested that support services supplementing methadone maintenance programs vary in their cost-effectiveness. This study examined the cost-effectiveness of varying levels of supplementary support services to determine whether the relative cost-effectiveness of alternative levels of support is sustained over time. A group of 100 methadone-maintained opiate users were randomly assigned to three treatment groups receiving different levels of support services during a 24-week clinical trial. One group received methadone treatment with a minimum of counseling, the second received methadone plus more intensive counseling, and the third received methadone plus enhanced counseling, medical, and psychosocial services. The results at the end of the trial period have been published elsewhere. This article reports the results of an analysis at a 6-month follow-up. The follow-up analysis reaffirmed the preliminary findings that the methadone plus counseling level provided the most cost-effective implementation of the treatment program. At 12 months, the annual cost per abstinent client was \$16,485, \$9,804, and \$11,818 for the low, intermediate, and high levels of support, respectively. Abstinence rates were highest, but modestly so, for the group receiving the high-intensity, high-cost methadone with enhanced services intervention. This study suggests that large amounts of support to methadone-maintained clients are not cost-effective, but it also demonstrates that moderate amounts of support are better than minimal amounts. As funding for these programs is reduced, these findings suggest a floor below which supplementary support should not fall.

**Lee, G. S. (1998). Influences on costs of mental health services: The role of integrated residential treatment for dually diagnosed patients. *Dissertation Abstracts International: Section B: The Sciences & Engineering*, 59(3-B), 1042. (University Microfilms No. AAM98-27009).**

This study examines the cost of mental health in the integrated mental health and addiction treatment of patients with co-occurring mental health and substance abuse diagnosis. The Medicaid claims of 102 patients were used to compare treatment in an integrated setting with treatment from a non-integrated setting. Integration was not shown to lead to lower costs for mental health treatment, although the authors did suggest that implementation of managed care significantly decreases the cost of care in both integrated and nonintegrated settings, and furthermore pointed out a pattern of dropout in the experimental group.

**Lennox, R. D., Scott-Lennox, J. A., & Holder, D. H. (1992). Substance abuse and family illness: Evidence from health care utilization and cost-offset research. *The Journal of Mental Health Administration*, 19(1), 83-95.**

Although the substance abuse treatment community recognizes that physical and psychological problems are common among families with a substance-abusing member, third-party funding for comprehensive treatment of the families of substance abusers is limited. Failure to provide treatment for these collateral effects of substance abuse on the family is thought to reduce the efficacy of substance abuse treatment, increase the risk of relapse, and leave untreated secondary pathology among family members. This article presents a review of health care utilization and cost-offset studies of the collateral effects of substance abuse on the family to aid administrators and planners in documenting the economic advantages of comprehensive treatment for the families of substance abusers.

**Lennox, R. D., Scott-Lennox, J. A., & Bohlig, E. M. (1993). The cost of depression-complicated alcoholism: Health-care utilization and treatment effectiveness. *The Journal of Mental Health Administration*, 20(2), 138-152.**

Clinical and epidemiologic evidence suggests that alcoholism complicated by concurrent or a lifetime history of depression is slower to remit and more prone to relapse than uncomplicated alcoholism. Consequently, alcoholics with a history of depressive illness, on average, are likely to use more health care and to have higher treatment costs than those without depression complications. This article contrasts evidence of the suitability of three models for predicting the impact of depression on an alcoholic's health-care use: a null model (assuming no differences), a cumulative-effect model (arguing for a linear increase associated with comorbid depression), and a synergistic model (wherein alcoholism complicated with depression is qualitatively as well as quantitatively different than uncomplicated alcoholism). To test these models, health-care costs and utilization of 491 "pure" alcoholics (those with no history of depression diagnosis) and 199 depression-complicated alcoholics, who received alcohol treatment while enrolled in a self-insured health-care program of a major U.S. manufacturing company, were compared. Results are discussed in terms of the implications for cost containment and the likelihood of relapse among the depression-complicated alcoholism group.

**Lessard, R. J., Harrison, P. A., & Hoffman, N. G. (1985). Costs and benefits of chemical dependency treatment. *Minnesota Medicine*, 68, 449-452.**

Cost benefits of alcoholism treatment are examined in a study of 190 patients admitted for treatment at a medical center. Data on physical, social, and occupational impairments resulting from alcohol abuse are presented. Substance abuse appeared to have a great impact on the patients in light of their high medical care utilization, poor vocational functioning, and high arrest rate. Changes during the six months following treatment are documented. The greatest reduction in demand for services was in the area of health care utilization. Occupational functioning showed measurable improvement: the proportion of patients on welfare dropped, the number employed increased, and work situations

improved. A dramatic decrease in the number of arrests was shown. The six-month follow-up reflects a 49 percent payback of treatment costs when arrests, health care utilization, and receipt of welfare benefits are measured.

**Leukefeld, C. G., Logan, T. K., Martin, S. S., Purvis, R. T., & Farabee, D. (1998). A health services use framework for drug-abusing offenders. *American Behavioral Scientist*, 41(8), 1123-1135.**

This article reviews recent literature of studies on the cost-effectiveness of health services utilized by drug abusers. The limited research performed demonstrates that publicly funded drug treatment reduces selected health care costs and decreases crime, leading to cost savings. Literature also suggests that the criminal justice system can effectively serve as a point of contact to a concentrated pool of drug users. The authors revise the R. Anderson and J. F. Newman (1973) model as a theoretical orientation for drug abuse initiatives.

**Lo, A., & Woodward, A. (1993). An evaluation of freestanding alcoholism treatment for Medicare recipients. *Addiction*, 88, 53-68.**

The Health Care Financing Administration (HCFA) and the National Institute on Alcohol Abuse and Alcoholism (NIAAA) conducted a demonstration between 1982 and 1985 to test the feasibility of providing payments for alcoholism treatment services to Medicare and Medicaid recipients in specially selected freestanding facilities. This study of the Medicare part of the demonstration answers two questions: Do freestanding facilities save money for Medicare, and do their patients have lower health care utilization following initiation of treatment than patients treated in hospital-based facilities? The statistical methodology is a logit and cluster approach. The analysis began with a logistic regression model to predict the probability of patients seeking alcoholism treatment in either the demonstration (freestanding facility) or hospital-based cohort. The statistically significant variables from logit analysis were then used to form clusters. The health expenditures of freestanding and hospital patients were compared within homogeneous clusters. This study showed that the number of admissions, the average length of stay, and the average monthly health expenditures following the start of treatment were lower for the group treated in the freestanding facilities. The conclusion is that for some persons with alcohol problems, treatment in freestanding facilities is less costly and leads to lower subsequent health care utilization than treatment in hospitals.

**Longabaugh, R., McCrady, B., Fink, E., Stout, R., McAuley, T., Doyle, C., & McNeill, D. (1983). Cost effectiveness of alcoholism treatment in partial versus inpatient settings. *Journal of Studies on Alcohol*, 44(6), 1049-1071.**

Six-month outcomes for alcohol misusers assigned to extended inpatient hospitalization and to partial hospitalization were comparable for alcohol consumption and social and vocational roles. However, the subjective well-being of partial hospital patients was greater and their treatment costs were lower.

**Lu, M. (1998). Economic evaluation of health care treatment effectiveness. *Dissertation Abstracts International Section A: Humanities & Social Sciences*, 58(7-A), 2757.**

This dissertation approaches the question of how to measure treatment outcomes and evaluate treatment effectiveness from an economic perspective. Included is a study of the effectiveness of outpatient care for substance abusers in Maine, in addition to a chapter devoted to the productivity of mental health care in Puerto Rico. The author emphasizes the importance of accounting for past treatment when calculating cost effectiveness of treatment.

**Machado, M. P. (2001). Dollars and performance: Treating alcohol misuse in Maine. *Journal of Health Economics*, 20, 639-666.**

If public funds are allocated efficiently, then an increase in funding should improve the performance of substance abuse treatment programs. In the data used in this paper, performance (measured as abstinence rates) and expenditures per patient are not positively correlated. One explanation is that funding is endogeneous, i.e. programs treating more difficult patients receive more funding. The data come from all of Maine's outpatient drug-free programs that received public funding between 1991 and 1994. After controlling for endogeneity, this paper concludes that the marginal impact of expenditures per patient on abstinence rates is small and statistically insignificant.

**Maddox, L. O. (1996). Drug courts: What's the verdict? *Corrections Compendium*, 21, 6-7.**

Drug courts combine needed substance abuse treatment with intensive, judicially monitored probation and frequent urinalysis to guarantee abstinence. In return for successful completion of the drug court program, participants have a "clean" criminal record. The Bureau of Justice Assistance's Drug Court Resource Center has recently published the first volume of "Drug Courts: An Overview of Operational Characteristics and Implementation Issues." This report is the first comprehensive profile of drug court programs in the United States, as it documents the operations and impact of 20 drug court programs that have operated for at least 1 year. The study found that recidivism has been significantly reduced for drug court program participants. There has been a significant decrease in drug use among most drug court participants while involved in the program, along with a substantial period of abstinence prior to graduation for those who successfully complete the program. An unanticipated beneficial impact of the programs has been the birth of a significant number of drug-free babies to women enrolled in the programs. Many programs are now expanding their targeted population, based on the success of their initial implementation experience. Support for the drug court programs from prosecutors and law enforcement officials has been strong. Judges involved with drug court programs believe that this approach is more effective than the traditional criminal case process for those offenders who want to address their substance abuse problem. The average cost for the treatment component of a drug court program ranges between \$900 and \$1,600 per participant. Savings in jail bed days alone have been estimated to be at least \$5,000 per defendant.

**Mauser, E., Van Stelle, K. R., & Moberg, D. P. (1994). The economic impact of diverting substance-abusing offenders into treatment. *Crime & Delinquency*, 40(4), 568-588.**

The economic impact of Treatment Alternative Programs (TAP) was studied by examining costs and benefits of diverting offenders from the criminal justice system into drug abuse treatment. All treatment programs were required to submit client monitoring data for clients screened between June 1990 and May 1991; during this 1-year period, 259 offenders were admitted to TAP. Programs provided monitoring data on clients at screening, 3 months into the program, and at program discharge. A client outcome study was also conducted that involved 112 of the 259 offenders. TAP costs included direct expenditures for treatment, drug testing, program overhead, case management services, medical expenses, and screening and assessment. TAP benefits affected not only clients in treatment but also family members, friends, and society. These benefits included lower criminal justice costs, increased productivity, improved health status, increased behavioral functioning, and reduced fear of crime. TAP also minimized the number of jail days served, the number of arrests, crime victim costs, and the number of lawyer visits. Estimated benefits of TAP outweighed costs in the short term. Depending on the assumptions made, the cost-benefit ratio for TAP ranged from 1.4 to 3.3. Cost-effectiveness data per jail day saved are provided.

**McCrady, B., Longabaugh, R., Fink, E., Stout, R., Beattie, M., & Ruggieri-Authalet, A. (1986). Cost-effectiveness of alcoholism treatment in partial hospital versus inpatient settings after brief inpatient treatment: 12-month outcomes. *Journal of Consulting and Clinical Psychology*, 54(5), 708-13.**

This cost-effectiveness study reports the outcomes of partial hospital treatment (PHT) versus extended inpatient rehabilitation (EIP). The 12-month outcomes of 115 of the 174 alcoholics that were randomly assigned to one of the two treatments are described in terms of clinical outcomes, employment, rehospitalizations and improvements in psychological well-being and social behavior. PHT and EIP groups demonstrated few differences in outcomes. Because the cost of PHT treatment is lower than EIP, the study concludes that PHT is a more cost-effective alternative to EIP for many alcoholics.

**McGlothlin, W. H., & Anglin, D. (1981). Shutting off methadone. *Archives of General Psychiatry*, 38, 885-892.**

This study reports the findings of a two-year follow-up of the 99 methadone clients enrolled in the Bakersfield, California, clinic when it was closed in September 1976. Because of the remote location, only 11 transferred to another clinic. A sample of 88 were selected from a continuing program for comparison. Ninety-five percent of the combined samples were interviewed. Fifty-four percent of the terminated clients became readdicted to heroin, and the arrest and incarceration rates were approximately double that for the comparison sample. The simultaneous initiation of a special police narcotic task force may have contributed to the arrest rate and limited the percent of time addicted. The net economic costs subsequent to discharge were slightly less than that for the comparison

group; however, when the benefits resulting from new admissions are considered, the clinic closing represented an economic loss in addition to the detrimental effects experienced by the clients.

**Mecca, A. M. (1997). Blending policy and research: The California Outcomes Study. *Journal of Psychoactive Drugs*, 29(2), 161-163.**

The author describes the purpose and major findings of the California Drug and Alcohol Treatment Assessment (CALDATA), an important study of treatment effectiveness commissioned by the California Department of Alcohol and Drug Programs. Benefits of addiction treatment found in the CALDATA study include a significant reduction in crime, improved health and reduced use of the health care system, reduced consumption of alcohol and other drugs, and benefits that far exceed costs. The study found that the \$209 million cost of treating approximately 150,000 participants in the 1992 sample yielded approximately \$1.5 billion in savings to taxpayers, mostly due to reduced crime; benefits of alcohol and other drug treatment outweighed the costs of treatment by ratios of from 4:1 to 12:1 depending on the type of treatment. The ratio was highest for discharged methadone participants and lowest, but still economically favorable, for participants in residential programs, including social model recovery houses.

**Merrill, J. (1999). Economic issues and substance abuse. In B. S. McCrady & E. E. Epstein (Eds.), *Addictions: A comprehensive guidebook* (pp. 595-610). New York: Oxford University Press.**

This chapter addresses the economics of substance abuse: how substance abuse services have been financed in the past; the emerging phenomenon of managed care and its impact on how substance abuse services are now financed, organized, and delivered; and the costs, costs-benefits, cost-effectiveness, and cost offsets associated with substance abuse prevention and treatment. Some of the issues discussed relative to financing substance abuse services are payment mechanisms, coverage limitations, cost sharing, preferred provider arrangements, and public financing mechanisms. Over the past decade, the world of health care has changed significantly, and these changes have been felt particularly acutely in the financing, organization, and delivery of substance abuse services. The dominant event in the health care system that has led to this dramatic change has been the emergence of managed care. A discussion of managed care is presented, especially as it relates to substance abuse treatment. Managed care has put the substance abuse treatment industry on the defensive. Basic questions are being raised about both the value of treatment in general and the comparative merit of one modality over another. Assessing the economic costs and benefits of treatment requires careful consideration of cost-benefit analyses, cost-effectiveness of treatments, and a general public understanding of societal costs of continued addiction. The era of the 28-day hospital treatment program, of inpatient detoxification, and even of some forms of lengthy outpatient care are over. Instead, new, shorter modalities, provided by lower level personnel, are the rule.

**Miller, N. S., Swift, R.M., & Gold, M. S. (1998). Health care economics for integrated addiction treatment in clinical settings. *Psychiatric Annals*, 28(12), 682-689.**

This article describes and analyzes the increasingly integrated health care system in which clinicians practice addiction care and provide mental health services. The costs and other impact of alcoholism and drug addiction on society are reported. Evidence is presented that addiction treatment is effective both in improving overall quality of life for individuals and in reducing the economic and social costs of alcoholism and drug addiction. Recommendations are made for active advocacy by clinicians for themselves and their patients in the political and economic processes that determine reimbursement policies for treatment providers.

**Miller, W. R., & Taylor, C. A. (1980). Relative effectiveness of bibliotherapy, individual and group self-control training in the treatment of problem drinkers. *Addictive Behaviors*, 5, 13-24.**

The effectiveness of four alternative forms of behavioral self-control training (BSCT) designed to reduce alcohol consumption was evaluated. Forty-one problem drinkers were assigned to one of four treatment conditions: (1) bibliotherapy, in which clients were evaluated and then provided with a self-help manual and self-monitoring cards but were not given therapy sessions; (2) BSCT alone, consisting of 10 individual sessions following material presented in the manual; (3) BSCT plus relaxation training, identical with condition (2) except that training in progressive deep muscle relaxation was added within the 10 sessions; and (4) group therapy identical in content to condition (3) but offered in a group rather than in individual format. Outcome data included information from client interviews, psychometric measures, self-monitoring cards, and interviews with significant others. All data sources indicated significant and substantial reduction in alcohol consumption, particularly in "alcoholismic" drinking patterns. No significant differences were found among the four treatment groups. The cost effectiveness of a bibliotherapy approach was supported. Overall improvement rates were 84 percent and 69 percent at 3-and 12-month follow-up, respectively.

**National Institute on Drug Abuse (1999). *Measuring and improving cost, cost-effectiveness, and cost benefit for substance abuse treatment programs*. (NIH Publication Number 99-1518). Bethesda, MD: Yates, B. T.**

The manual presents several methods for determining cost effectiveness and benefits of substance abuse treatment centers. These methods are meant to be practical—the directions clearly present instructions for the collection and utilization of cost, procedure, and benefit data. The manual is aimed at people of various professions, including those without a background in accounting.

- O'Farrell, T. J., Choquette, K. A., Cutter, H. S. G., Brown, E., Bayog, R., McCourt, W., Lowe, J., Chan, A., & Deneault, P. (1996). Cost-benefit and cost-effectiveness analyses of behavioral marital therapy with and without relapse prevention sessions for alcoholics and their spouses. *Behavior Therapy*, 27, 7-24.**

This study reports on cost-benefit and cost-effectiveness analyses among male alcoholics treated in a behavioral marital therapy (BMT) program with and without additional relapse prevention (RP) sessions. Cost-effectiveness analyses sought to determine which of the two treatments being compared (BMT or BMT plus RP sessions) produced desired clinical outcomes of reduced drinking and improved marital functioning at the lower cost. Fifty-nine couples with a newly abstinent alcoholic husband participated in 5 to 6 months of weekly BMT, with approximately half being randomly assigned to an additional 15 conjoint couples RP sessions over the next 12 months. Of the 73 couples who completed pregroup sessions and started the BMT couples group, 64 couples completed at least 5 BMT sessions and the post BMT assessment. Cost-benefit analysis results indicated that alcohol-related health care and legal system utilization costs decreased after BMT. Furthermore, positive cost-benefit results showed that the costs of providing BMT in alcoholism treatment were offset by reductions in health care and legal costs in the year following BMT. Results indicated that the additional RP sessions did not lead to significant cost savings in health care or legal system utilization. BMT only was more cost-effective than BMT plus RP, although BMT plus RP did lead to less drinking and better marital adjustment. Since BMT only was actually less effective than BMT plus RP in producing abstinence, it was the lower cost of BMT only that produced its greater cost-effectiveness.

- O'Farrell, T. J., Choquette, K. A., Cutter, H. S., Floyd, F. J., Bayog, R., Brown, E. D., Lowe, J., Chan, A., & Deneault, P. (1996). Cost-benefit and cost-effectiveness analyses of behavioral marital therapy as an addition to outpatient treatment. *Journal of Substance Abuse*, 8(2), 145-166.**

Thirty-six newly abstinent married male alcoholics, who had recently begun outpatient individual alcoholism counseling, were randomly assigned to a no-marital-therapy control group or to 10 weekly sessions of a behavioral marital therapy (BMT) or an interactional couples group. The cost-benefit analysis of BMT plus individual alcoholism counseling showed (a) decreases in health care and legal costs in the 2 years after as compared to the year before treatment, (b) a positive cost offset, and (c) a benefit-to-cost ratio greater than 1 indicating that health and legal system cost savings (i.e., benefits) exceeded the cost of delivering the BMT treatment. None of the positive cost-benefit results observed for BMT were true for participants given interactional couples therapy plus individual alcoholism counseling for which post treatment utilization costs increased. Thus, adding BMT to individual alcoholism counseling produced a positive cost benefit, whereas the addition of interactional couples therapy did not. Individual counseling both alone and with BMT added showed substantial and significant cost savings from reduced utilization that substantially and significantly exceeded the cost of delivering the treatment; and the two treatments did not differ significantly on these cost savings and cost offsets.



Individual counseling alone did have a significantly more positive benefit-to-cost ratio than BMT plus individual counseling due to the lower cost of delivering the individual counseling which was about half the cost of delivering BMT plus individual counseling. Cost-effectiveness analyses indicated that BMT plus individual counseling were less cost effective than individual counseling alone and modestly more cost effective than interactional therapy in producing abstinence from drinking. When marital adjustment outcomes were considered, the three treatments were equally cost effective except during the active treatment phase when BMT was more cost effective than interactional couples therapy. Study limitations are discussed.

**Peele, S. (1990). Research issues in assessing addiction treatment efficacy: How cost effective are Alcoholics Anonymous and private treatment centers? *Drug and Alcohol Dependence*, 25, 179-182.**

This article is a discussion on research issues in assessing addiction treatment efficacy. According to Miller and Hester, in the United States, present policies entail few conditions of accountability for quality or effectiveness in treatment programs. Instead, treatment practices in the United States are based on historical traditions and folk beliefs that owe more to religion and temperance movements than to research. To decide whether a treatment does anything, similar patients who have not received the treatment must be analyzed. Failure to subject treatment approaches to systematic evaluation will not benefit addicts in the way advocates of private hospital treatment seem to hope, but will only make it harder to discover the best treatment for each patient.

**Pettinati, H. M., Evans, B. D., Kaplan, F. N., Hadley, T. R., Meyers, K., Ruetsch, C. R., & Jensen, J. M. (1999). Inpatient alcohol treatment in a private healthcare setting: Which patients benefit and at what cost? *The American Journal on Addictions*, 8, 220-233.**

This study investigated whether selected patients have better outcomes with inpatient than outpatient treatment. There were 93 inpatients and 80 outpatients with alcohol dependence who were evaluated at treatment entry to a private healthcare setting. Patients with multiple drinking-related consequences were less likely to return to significant drinking in the first 3 months after treatment ended if they had attended inpatient compared to outpatient treatment. Thus, inpatient appeared to have some advantage over outpatient treatment in the early recovery period for patients with multiple drinking-related consequences. The gap between inpatient and outpatient costs was also reduced when computed as a cost-effectiveness ratio, although treatment costs continued to remain proportionally higher with inpatient than outpatient treatment.

**Rajkumar, A. S., & French, M. T. (1997). Drug abuse, crime costs, and the economic benefits of treatment. *Journal of Quantitative Criminology*, 13(3), 291-323.**

Several studies have examined the social consequences and costs of criminal activity. The most popular approach for estimating the costs of crime focuses on easily measurable

factors such as incarceration costs, victims' out-of-pocket expenses, medical costs, and lost earnings; however, the intangible losses incurred by crime victims have rarely been considered. These losses include pain and suffering as well as loss of the enjoyment of living. Based on recent developments by Cohen and colleagues, the current study adopted a more comprehensive method for estimating losses. The methodology used imputed the cost of pain and suffering for each type of crime-related injury, using data on jury awards in civil cases where the medical expenses and lost wages are known. The estimated crime-related costs incurred during the period prior to treatment admission and the period after treatment discharge are significantly higher when calculated by using the proposed method compared to methods that consider only tangible costs. Furthermore, a simple benefit-cost comparison of criminal activity outcomes shows that drug abuse treatment has the potential to return net benefits to society through crime reduction. Although the treatment outcomes were not based on an experimental design, this study presents quantitative evidence that including victims' intangible losses can substantially raise the estimated dollar benefits of avoided criminal activity due to drug abuse interventions.

**Reiff, S., Griffiths, B., Forsythe, A. B., & Sherman, R. M. (1981). Utilization of medical services by alcoholics participating in a health maintenance organization outpatient treatment program: Three-year follow-up. *Alcoholism: Clinical and Experimental Research*, 5(4), 559-562.**

In a cumulative 3-yr follow-up study of utilization of medical services by alcoholics participating in a health insurance maintenance organization (HMO) outpatient alcoholism treatment program, expenditures of 59 alcoholics were compared with those of 78 alcoholics who chose not to participate. Results show significant differences in dollar cost per patient per year between groups in inpatient expenditures ( $p = 0.03$ ). When alcoholism clinic costs were excluded from combined inpatient and outpatient expenditures, significance was maintained over the 3 years ( $p = 0.02$ ). In combined inpatient and outpatient expenditures including alcoholism treatment costs, the dollar differential between groups was substantial but not statistically significant.

**Reutzel, T. J., Becker, F. W., & Sanders, B. K. (1987). Expenditure effects of changes in Medicaid benefit coverage: An alcohol and substance abuse example. *American Journal of Public Health*, 77(4), 503-504.**

An evaluation of the effect on total health care costs of a Medicaid demonstration project to provide coverage for alcoholism and substance abuse was conducted in Illinois in 1985. A pre/post-treatment analysis of expenditures for a subgroup of demonstration clients suggests that the addition of the alcohol and drug benefit did not result in higher total expenditures. An important policy implication is that, when medical services substitute for one another, costs savings (increases) will not necessarily be realized when benefit packages are cut (expanded).

**Richman, A. (1983). Cost/effectiveness analysis of alcoholism and drug abuse treatment programs: The relevance of recidivism and resource absorption. *Evaluation and Program Planning*, 6, 49-52.**

Cost/effectiveness measures are increasingly being applied to alcoholism and drug abuse treatment programs. Program evaluators usually regard readmissions as inadequate for assessing outcome, and resource absorption is rarely examined; this paper presents the argument that increased attention to recidivism and resource absorption is integral to the program evaluation process. Readmissions formed 53 percent of admissions to U.S. drug abuse programs, and in alcoholism treatment centers, 4 percent of the patients accounted for 24 percent of the detoxifications. Problems with assessing cost/effectiveness are associated with duration of treatment, average cost, time span of analyses, quasi-experimental designs, multiple episodes of treatment, "silting up," and extrapolation. Five approaches to dealing with these problems are suggested: analyzing existing program databases for recidivism and resource absorption, considering recidivism when evaluating programs, tempering clinical enthusiasm with skepticism, matching patients with levels of care appropriate to previous treatment history, and assessing additional benefit derived from increasing amounts of care per patient as part of cost/effectiveness analysis.

**Rosenbach, M. L., & Huber, J. H. (1994). Utilization and cost of drug abuse treatment under Medicaid: An in-depth study of Washington. In G. Denmead, & B. A. Rouse (Eds.), *Financing drug treatment through state programs*, (NIDA Services Research Monograph No. 1, pp. 51-94). Rockville, MD: National Institute on Drug Abuse.**

This report is a case study of Medicaid utilization in Washington State. Using Medicaid's Statistical Information System (MSIS), the report describes the substance abuse treatment system in Washington State and quantifies the extent of Medicaid spending for drug treatment services. The authors discuss several reasons why spending is limited for substance abuse services. The authors sought to fill information gaps in terms of Medicaid funding of drug abuse services through an in-depth analysis of Medicaid costs and utilization of drug abuse services in Washington State. The study addressed the following areas: amount spent, population served, providers, and unit costs. The first section of the report describes the Washington State system for financing drug abuse treatment services. The MSIS data source is described in the second section along with methods used to construct the analytic file. Results of the claims analysis are presented in the third section. The final section discusses the policy implications and caveats of the authors' results.

**Rosenheck, R., & Kosten, T. (2001). Buprenorphine for opiate addiction: Potential economic impact. *Drug and Alcohol Dependence*, 63, 253-262.**

This study evaluated the potential economic impact of the buprenorphine/naloxone combination in the context of practice in the United States of America. In comparison to treatment provided through methadone clinics, buprenorphine/naloxone therapy in office practice may be associated with increased medication, physician, and nursing costs, but

reduced costs for dispensing, toxicology screens, counseling and administration. It may also result in markedly reduced costs for patients, especially travel costs, resulting in net savings for society as a whole. A review of controlled studies suggest that buprenorphine/naloxone is not likely to be any more or less effective than methadone, but since it will be less expensive in the long run, it may be more cost-effective than methadone when provided to comparable groups of patients. Because of the convenience of office-based treatment, buprenorphine/naloxone may increase access to opiate substitution for some addicts. To the extent that treatment is provided to additional high-cost patients who are involved in extensive criminal activity or who undergo multiple detoxifications each year, net cost savings could be substantial. To the extent that treatment is extended to better adjusted addicts who are employed, married and experience fewer adverse effects from their addiction, costs could increase. The total cost impact will depend on which addict sub-populations make greatest use of the treatment opportunity presented by buprenorphine/naloxone.

**Rydell, C. P., & Everingham, S. S. (1994). *Controlling cocaine: Supply versus demand programs* (MR-331-ONDCP/A/DPRC). Santa Monica, CA: RAND.**

This report analyzes the relative cost-effectiveness of various available drug interventions. Four such interventions analyzed in this document are (1) source country control; (2) interdiction; (3) domestic enforcement; and (4) treatment of heavy users. The first three of these programs focus on "supply-control," whereby the cost of supplying cocaine is increased by seizing drugs and assets and by arresting and incarcerating dealers and their agents. The fourth program is a "demand-control" program, because it reduces consumption directly without going through the price mechanism. This study states that an estimated \$13 billion are being spent in the United States each year on the four drug programs listed above and that the bulk of those resources is spent on domestic enforcement. Treatment of heavy users has only a small percentage of this budget, even when privately funded treatment is included. Given the high cost of "supply control" programs, this report concludes that treatment of heavy users may be a more cost-effective way of dealing with drug interventions.

**Salomé, H. J., & French, M. T. (2001). Using cost and financing instruments for economic evaluation of substance abuse treatment services. In Galanter (Ed.), *Recent developments in alcoholism: Vol. 15. Services research in the era of managed care* (pp. 253-269). New York: Kluwer Academic/Plenum Publishers.**

Standardized economic evaluation instruments are an important tool in the analysis of change and performance of addiction treatment. Nevertheless, compared to other health care sectors, economic evaluation of addiction treatment is still rare. The present paper proposes two comprehensive economic evaluation instruments that are methodologically sound and that meet the objectives of comprehensiveness, standardization, and comparability. The Drug Abuse Treatment Cost Analysis Program (DATCAP) can be used to estimate the economic cost of treatment services; the Drug Abuse Treatment Financing Analysis Program (DATFin) is a companion instrument and analyzes the

complexity and change of treatment financing. This paper outlines the contents of each instrument and, for illustrative purposes, presents results from several case studies. Suggestions for updates and enhancements for each instrument are also discussed.

**Saxe, L., Dougherty, D., Esty, K., & Fine, M. (1983). Analyses of the costs and benefits of alcoholism treatment. In *Office of Technology Assessment Health Technology Case Study 22: The effectiveness and costs of alcoholism treatment* (pp. 57-66). Washington, DC: U.S. Government Printing Office.**

This chapter describes the costs and benefits of alcoholism treatment and discusses reimbursement of alcoholism treatment. Cost-effectiveness, cost-benefit and cost of alcoholism methodologies are described as well. The goal of the chapter is to provide a framework for consideration of Medicare and other reimbursement policies for alcoholism treatment. Suggestions for future research are also provided.

**Schinka, J. A., Francis, E., Hughes, P., LaLone, L., & Flynn, C. (1998). Comparative outcomes and costs of inpatient care and supportive housing for substance-dependent veterans. *Psychiatric Services*, 49(7), 946-950.**

This study examined the differential effectiveness and costs of three weeks of treatment for patients with moderately severe substance dependence assigned to inpatient treatment or to a supportive housing setting. Supportive housing is temporary housing that allows a patient to participate in an intensive hospital-based treatment program. Type and intensity of treatment were generally equivalent for the two groups. Patients were consecutive voluntary admissions to the substance abuse treatment program of a large metropolitan Veterans Affairs medical center. Patients with serious medical conditions or highly unstable psychiatric disorders were excluded. Patients in supportive housing attended the inpatient program on weekdays from 7:30 a.m. to 5 p.m. They were assessed at baseline and at two-month follow-up. Baseline analyses of clinical, personality, and demographic characteristics revealed no substantive differences between the 62 patients assigned to inpatient treatment and the 36 assigned to supportive housing. The degree of treatment involvement and dropout rates did not differ between groups. Of the 55 inpatients completing treatment, 29 were known to be abstinent at follow-up, and of the 35 supportive housing patients completing treatment, 22 were abstinent. The proportion was similar for both groups, about 70 percent. The cost of a successful treatment for the inpatient group was \$9,524. For the supportive housing group, it was \$4,291. Given the absence of differential treatment effects between inpatient and supportive housing settings, the use of supportive housing alternatives appears to provide an opportunity for substantial cost savings for VA patients with substance dependence disorders.

**Schneider, R., Mittelmeier, C., & Gadish, D. (1996). Day versus inpatient treatment for cocaine dependence: An experimental comparison. *The Journal of Mental Health Administration*, 23(2), 234-245.**

This study was designed to explore the question of whether day treatment is a viable alternative to inpatient treatment for cocaine-dependent patients. Inpatient subjects were compared with day treatment subjects in a randomized, prospective study design. Treatment outcome was evaluated at three and six months post-treatment. At three months posttreatment, the inpatient group had a statistically significant higher rate of total abstinence than the day-treatment group, but the difference at six months was not statistically significant. The two groups also were statistically comparable at six months posttreatment in terms of current abstinence and in terms of other measures. Average costs for day-treatment subjects was 48-61 percent of the cost for inpatient subjects. The results of this study support the use of day treatment as a clinically and economically effective alternative to inpatient treatment for many cocaine-dependent patients, especially when steps are taken to minimize drop-out.

**Schoenbaum, M., Zhang, W., & Sturm, R. (1998). Costs and utilization of substance abuse care in a privately insured population under managed care. *Psychiatric Services*, 49(12), 1573-1578.**

Cost and utilization patterns of substance abuse and mental health treatment under private, employer-sponsored, managed behavioral health care plans were examined. Data were from claims made in 1995 in 93 behavioral health care plans covering 617,133 members. Rates of use of mental health and substance abuse care were determined, as were payments by insurers and patients for the two types of care. Means were calculated per plan member and per user of either of these service types. Approximately 0.3 percent of plan members used any substance abuse services; 5.2 percent used mental health services. However, among substance abuse patients, average costs were more than twice as high as average costs for mental health patients. For substance abuse treatment, the annual cost per user was \$2,188, compared with \$979 for users of mental health care. Annual per-member costs were \$6.51 for substance abuse treatment and \$50.08 for mental health care. Higher costs for substance abuse treatment reflected greater rates of use of both inpatient and intensive outpatient treatment. Overall, substance abuse costs represented 13 percent of insurance payments for behavioral health care and perhaps 4 percent of the cost of health insurance overall. The authors conclude that substance abuse coverage accounts for a small fraction of insurance payments for behavioral health coverage and a very small fraction of insurance payments for both physical and behavioral health care.

- Schoenwald, S. K., Ward, D. M., Henggeler, S. W., Pickrel, S. G., & Patel, H. (1996). Multisystemic therapy treatment of substance abusing or dependent adolescent offenders: Cost of reducing incarceration, inpatient, and residential placement. *Journal of Child and Family Studies*, 5(4), 431-444.**

The cost benefits of multi-systemic therapy (MST) for 118 substance abusing or dependent juvenile offenders was examined with relation to reduction in days of incarceration, hospitalization, and residential treatment at about one year post-referral. Data were obtained from official records, family interviews, and Medicaid rates, which served as proxies for cost. Results showed that incremental costs of MST were nearly offset by the savings from the reductions in days of out-of-home placement during the year.

- Sheffet, A. M., Kakumanu, P. V., Lavenhar, M. A., & Feuerman, M. (1982). Treatment benefit functions for a drug abuse rehabilitation treatment system. *Social Science and Medicine*, 16(24), 2109-2116.**

While generally justifying the large amount of money invested in the treatment effort, evaluation studies of treatment centers for drug addiction do not offer a rational method of allocating scarce resources among the various available treatment programs. The problem is further confounded by different costs associated with the different programs and also because clients rarely complete the prescribed treatment. The authors developed functional relationships between treatment outcomes and time in treatment that allow the inclusion of probable length of stay of patients and cost per week for a particular treatment program in the evaluation considerations. The model evolved from a drug addiction treatment system operating in Newark, New Jersey, consisting of six different treatment centers. Treatment outcome measures were derived from a psychosocial questionnaire which was administered to patients at appropriate time intervals. The questionnaire probed into the important facets of human behavior as related to the use or non-use of drugs for non-medical reasons. Gompertz curves reflecting treatment benefit were computed for each treatment center by least square fit of the collected data to appropriate differential equations and used together with cost of treatment and treatment retention rates to compute expected net benefit for each treatment center. These enable the researcher to find the treatment centers with the best treatment outcome or alternately with the best expected cost benefit ratio for any patient type.

- Shepard, D. S., & Maynard, D. B. (1997). Empirically-based assignment of clients to alternative substance abuse treatments: An application of multivariate cost-effectiveness analysis. *Abstract Book Association for Health Services Research*, 14, 34.**

The objective of this study was to examine how managed care organizations, providers, and public agencies should allocate substance abuse treatment slots among clients and assign clients to modalities in order to achieve favorable outcomes with limited funds. The authors developed and applied a multivariate cost-effectiveness analysis technique to substance abuse treatment services in the State of Ohio. The sample included 2,941

clients who entered treatment during fiscal years 1993 through 1995 at a facility, which contracted with the state's substance abuse agency. Data were collected at baseline and 6 and 12 months after treatment. Cost effectiveness was the cost per abstinent client. The independent variables included client and treatment characteristics. For every type of care assessed, treatment was most cost-effective for clients who were female, white, in the oldest age category (40+), and were not depressed. The most cost-effective type of care was outpatient care for clients in the mildest and intermediate categories of frequency of use (\$7,585 and \$13,932 per abstinent year, respectively). The most cost-effective type of care was residential short term rehabilitation (\$18,935 per abstinent year) for clients with high frequency of use. Long-term rehabilitation was the least cost-effective type of care (\$54,877 per abstinent year).

**Siegel, C., Haugland, G., Goodman, A., & Wanderling, J. (1984). Severe alcoholism in the mental health sector: I. A cost analysis of treatment. *Journal of Studies on Alcohol*, 45(6), 504-509.**

In a country in which the public mental health sector provides services to alcoholics, the costs of direct care to alcoholics were compared with those of other mental health patients. Costs were developed for a 1-yr cohort of patients who had received inpatient care but who had recently come from the community and returned to the community. The costs were based on inpatient and outpatient utilization within two years of follow-up, commencing at discharge from inpatient care. Alcoholics represented the largest single diagnostic group in the cohort (39%), although their cost of care was only 22 percent of total costs. This is so despite the facts that similar percentages of alcoholics and nonalcoholics required rehospitalization in the two years of follow-up and both groups exhibited similar patterns in the number of readmissions. Alcoholics have lower costs than other patients because they use cumulatively fewer inpatient days and receive fewer days of the most expensive outpatient service of full-day treatment. On the average, the cost to serve alcoholic patients is less than half the cost to serve nonalcoholic patients.

**Sindelar, J. L., & Manning, W. G., Jr. (1997). Cost-benefit and cost-effectiveness analysis: Issues in the evaluation of the treatment of illicit drug abuse. In J. A. Egertson, D. M. Fox, & A. I. Leshner (Eds.), *Treating drug abusers effectively* (pp. 187-221). Malden, MA: Blackwell Publishers.**

This chapter begins with a brief overview of the principles of cost-benefit and cost-effectiveness analysis. Then the authors present a discussion on the issue of perspective when evaluating substance abuse treatment programs, including whether to take the perspective of society, of payers or of providers. Next, the issue of multiple outcomes is examined. Specifically, the authors discuss which benefits researchers should include in their evaluations. In the final section of the chapter, the authors present information on directions for future research. The appendix reviews some of the literature on several of these types of studies.



**Sturm, R., Stein, B., Zhang, W., & Stan, P. J. E. (2001). Alcoholism treatment in managed private sector plans: How are carve-out arrangements affecting costs and utilization? In Galanter (Ed.), *Recent developments in alcoholism: Vol. 15. Services research in the era of managed care* (pp. 271-284). New York: Kluwer Academic/Plenum Publishers.**

This study examines the cost and utilization patterns of 339,265 members of 77 carved-out employer-sponsored managed care plans. The article takes a comparative look at the relative costs and utilization of all alcohol, drug and mental health care by type of treatment and member type. The study also describes follow-up costs and member disenrollment patterns.

**Svikis, D. S., Golden, A. S., Huggins, G. R., Pickens, R. W., McCaul, M. E., Velez, M. L., Rosendale, C. T., Brooner, R. K., Gazaway, P. M., Stitzer, M. L., & Ball, C. E. (1997). Cost-effectiveness of treatment for drug-abusing pregnant women. *Drug and Alcohol Dependence*, 45, 105-113.**

Neonatal intensive care unit (NICU) and drug treatment costs were compared in two groups of pregnant drug abusing women: 100 admissions to a multidisciplinary treatment program and active in care at the time of delivery and 46 controls not entering drug treatment. Clinical measures included urine toxicology at delivery, infant birthweight, Apgar scores, and need for and duration of NICU services. Cost measures included drug treatment and NICU costs. Treatment patients showed better clinical outcome at delivery, with less drug use and higher infant estimated gestational age, birthweight and Apgar scores. Infants of treatment patients were also less likely to require NICU services and, for those that did, had a shorter stay. When total cost was examined (including drug treatment), mean net savings for treatment subjects was \$4644 per mother/infant pair. The study demonstrates the cost-effectiveness of treatment for pregnant drug abusing women, with savings in NICU costs exceeding costs of drug treatment.

**U.S. Department of Health and Human Services. (2000). Cost research on alcoholism treatment. In 10<sup>th</sup> Special report to the U.S. Congress on alcohol and health. Rockville, MD: National Institute on Alcohol Abuse and Alcoholism.**

This report presents new research about alcohol abuse and alcoholism since 1997. This chapter provides a summary of analyses of the costs and cost-effectiveness of treatment for alcohol use disorders in recent years. Such research has provided insight into the long-term costs and benefits of alternative approaches to alcoholism treatment. A discussion of continuing issues of cost-effectiveness and cost offsets is presented, along with a description of more recent topics of research, including length of treatment, long-term costs and new developments in measuring costs.

**U.S. Department of Health and Human Services. (2000). *Changing the conversation: Improving substance abuse treatment-The National Treatment Plan Initiative* (DHHS Publication No. SMA 00-3479). Rockville, MD: Substance Abuse and Mental Health Services Administration.**

This report presents a set of guidelines and recommendations to improve substance abuse treatment. It presents the full reports from expert panels, summaries of public hearings, and public comments. Five expert panels were convened on the following topical areas: closing the treatment gap; reducing stigma and changing attitudes; improving and strengthening treatment systems; connecting services and research; and addressing workforce issues.

**Vaughn, T., Vaughn, M., Borders, T., & Hall, J. (1998). Six month cost-effectiveness of case management for substance abuse treatment. *Abstract Book Association for Health Services Research, 15*, 302-303.**

Case management has been proposed as a cost effective approach for treating substance abuse disorders. Surprisingly, though, few studies have examined the cost effectiveness of case management. This study, which is part of a larger clinical trial, describes the cost effectiveness of six months of case management for individuals treated for substance abuse. Individuals seeking inpatient or outpatient treatment at a substance abuse treatment center were recruited for participation in this study. Participants were randomly assigned to one of four treatment conditions (conditions A, B, C and D), three of which included some form of case management. Costs were estimated from case managers' work logs of the activities they engaged in with or on the behalf of each client. Effectiveness was measured as six-month follow-up scores on the seven subscales derived from the Addiction Severity Index (ASI) and the number of days in the past month that the person had used any substance. Marginal cost and marginal effectiveness were then calculated using dummy variable regression. Scores on the seven ASI scales and days using any substance were used as outcome variables for the type of case management received and controlled for age and gender. Similarly, cost was the dependent variable in a regression model that contained dummy variables for the type of case management received and controlled for the same covariates. The principal finding was that, while treatment was effective for all four groups of patients, results of regression analyses indicated that case management was not more cost effective than treatment without case management, regardless of the approach used. It should be noted, though, that individuals in each condition did experience significant improvement over time in their scores on the ASI subscales. The authors conclude that at six months after initial treatment begins, case management for substance abuse is not cost effective, at least when using scores on the ASI or days using any substance as measures of effectiveness. However, the results should be viewed with caution. The additional benefits of case management may accrue over a longer time period than was measured for this study. Moreover, other measures of effectiveness could yield different results.

**Walsh, D. C., Hingson, W. H., Merrigan, D. M., Levenson, S. M., Cupples, A., Heeren, T., Coffman, G. A., Becker, C. A., Barker, T. A., Hamilton, S. K., McGuire, T. G., & Kelly, C. A. (1991). A randomized trial of treatment options for alcohol-abusing workers. *The New England Journal of Medicine*, 325(11), 775-782.**

Employee-assistance programs sponsored by companies or labor unions identify workers who abuse alcohol and refer them for care, often to inpatient rehabilitation programs. Yet the effectiveness of inpatient treatment, as compared with a variety of less intensive alternatives, has repeatedly been called into question. This study, anchored in the work site, compared the effectiveness of mandatory in-hospital treatment with that of required attendance at the meetings of a self-help group and a choice of treatment options. A series of 227 workers newly identified as abusing alcohol were randomly assigned to one of three rehabilitation regimens: compulsory inpatient treatment, compulsory attendance at Alcoholics Anonymous (AA) meetings, and a choice of options. Inpatient backup was provided if needed. The groups were compared in terms of 12 job-performance variables and 12 measures of drinking and drug use during a two-year follow-up period. All three groups improved, and no significant differences were found among the groups in job-related outcome variables. On seven measures of drinking and drug use, however, we found significant differences at several follow-up assessments. The hospital group fared best and that assigned to AA the least well; those allowed to choose a program had intermediate outcomes. Additional inpatient treatment was required significantly more often ( $P$  less than 0.0001) by the AA group (63%) and the choice group (38%) than by subjects assigned to initial treatment in the hospital (23%). The differences among the groups were especially pronounced for workers who had used cocaine within six months before study entry. The estimated costs of inpatient treatment for the AA and choice groups averaged only 10 percent less than the costs for the hospital group because of their higher rates of additional treatment. The authors conclude that, even for employed problem drinkers who are not abusing drugs and who have no serious medical problems, an initial referral to AA alone or a choice of programs, although less costly than inpatient care, involves more risk than compulsory inpatient treatment and should be accompanied by close monitoring for signs of incipient relapse.

**Weisner, C., Mertens, J., Parthasarathy, S., Moore, C., Hunkeler, E. M., Hu, T., & Selby, J. V. (2000). The outcome and costs of alcohol and drug treatment in an HMO: Day hospital versus traditional outpatient regimens. *Health Services Research*, 35(4), 791-812.**

The objective of this study was to compare outcome and cost-effectiveness of the two primary addiction treatment options, day hospitals (DH) and traditional outpatient programs (OP) in a managed care organization, in a population large enough to examine patient subgroups. Data sources included interviews with new admissions to a large HMO's chemical dependency program in Sacramento, California between April 1994 and April 1996, with follow-up interviews eight months later. Computerized utilization and cost data were collected from 1993 to 1997. The study design was a randomized control trial of adult patients entering the HMO's alcohol and drug treatment program ( $N = 668$ ).

To examine the generalizability of findings as well as self-selection factors, the authors also studied patients presenting during the same period who were unable or unwilling to be randomized (N = 405). Baseline interviews characterized type of substance use, addiction severity, psychiatric status, and motivation. Follow-up interviews were conducted at eight months following intake. Breathanalysis and urinalysis were conducted. Program costs were calculated. Interview data were merged with computerized utilization and cost data. Among randomized subjects, both study arms showed significant improvement in all drug and alcohol measures. There were no differences overall in outcomes between DH and OP, but DH subjects with midlevel psychiatric severity had significantly better outcomes, particularly in regard to alcohol abstinence (OR = 2.4; 95% CI = 1.2, 4.9). The average treatment costs were \$1,640 and \$895 for DH and OP programs, respectively. In the midlevel psychiatric severity group, the cost of obtaining an additional person abstinent from alcohol in the DH cohort was approximately \$5,464. Among the 405 self-selected subjects, DH was related to abstinence (OR = 2.1; 95% CI = 1.3, 3.5). Although significant benefits of the DH program were not found in the randomized study, DH treatment was associated with better outcomes in the self-selected group. However, for subjects with mid-level psychiatric severity in both the randomized and self-selected samples, the DH program produced higher rates of abstention and was more cost-effective. Self-selection in studies that randomize patients to services requiring very different levels of commitment may be important in interpreting findings for clinical practice.

**Westermeyer, J., Eames, S. L., & Nugent, S. (1998). Comorbid dysthymia and substance disorder: Treatment history and cost. *American Journal of Psychiatry*, 155(11), 1556-1560.**

The purpose of this study was to determine the treatment history and cost of previous treatment among patients with comorbid substance-related disorder and dysthymia, as compared to patients with substance-related disorder only. Retrospective data were obtained regarding past treatment. Treatment cost was calculated on the basis of the 1996 cost of various treatment modalities. The setting was alcohol-drug programs located within departments of psychiatry in two centers. A total of 642 patients were assessed, of whom 39 had substance-related disorder and dysthymia and 308 had substance-related disorder only (the remaining patients had other comorbid conditions). Data collection instruments included an interview-based questionnaire regarding previous psychiatric and substance abuse treatment. Current cost of treatment in various settings was assessed on the basis of a survey of facilities used by patients in this area. Patients with substance-related disorder and dysthymia had received more substance-related disorder treatment in 18 of 20 measures. Patients with substance-related disorder and dysthymia used 4.7 times more substance-related disorder treatment dollars than patients with substance-related disorder only, although their demographic characteristics were similar. Past self-help activities and pharmacotherapy were remarkably similar for both groups. Although substance-related disorder treatment differed considerably between the two groups of patients, other types of psychiatric treatment (i.e., non-substance-related treatment ) did not differ between the two groups. The authors conclude that patients with substance-

related disorder and dysthymia are referred to (or seek) substance-related disorder treatment more often than patients with substance-related disorder only but are referred to (or seek) non-substance-related psychiatric treatment no more often than patients with substance-related disorder only. The cost of previous substance-related disorder treatment was several times higher for the patients with substance-related disorder and dysthymia.

**Wexler, H. K. (1996). Evaluation of prison substance abuse treatment programs: Outcome studies and methodology. In K. E. Early (Ed.), *Drug treatment behind bars: Prison-based strategies for change* (pp. 109-131). Westport, CT: Praeger Publishers/Greenwood Publishing Group.**

Outcome evaluations of prison therapeutic communities are assessed. The results of several landmark prison drug treatment outcome studies are reviewed to display the kinds of evaluation data that have influenced correctional drug treatment policy. The landmark studies are evaluations of prison therapeutic communities that produced significant reductions in recidivism rates. An overview is presented of prison substance abuse treatment evaluation methodology to evaluate program implementation, process, outcomes, and the assessment of cost effectiveness and cost benefit. Finally, the ingredients of a prison-based substance abuse evaluation proposal are discussed and suggestions are made for attaining updated information and seeking research and evaluation funding.

**The White House President's Commission on Model State Drug Laws. (1993). *Socioeconomic evaluations of addictions treatment*. Piscataway, NJ: Rutgers University, Center of Alcohol Studies.**

The authors reviewed the existing literature on socioeconomic evaluations of untreated substance abuse addictions and substance abuse addiction treatment. The publication first discusses the various methods of conducting socioeconomic evaluations. Then the authors discuss addiction treatment in general clinic populations, workforce populations, criminal justice populations, and pregnant women populations. The report ends with recommendations for policymakers and scientists.

**Wing, D. M., & Gay, G. (1990). Determining alcoholism treatment outcomes: A cost-effectiveness perspective. *Nursing Economics*, 8(4), 248-255.**

This article proposes quantitative measures and a model for determining cost-effectiveness and cost-benefit of alcohol treatment programs as a basis for reimbursement policies.

**Wing, D. M., & Gay, G. (1991). A critical literature review of alcoholism treatment cost-benefit/effectiveness. *Journal of Nursing Quality Assurance*, 5(4), 28-40.**

The effectiveness and cost/benefit analyses of alcoholism treatment are discussed. Headings within this review of the literature include: (1) reimbursement policy; (2) alcoholism treatment effectiveness; and (3) cost-benefit and cost-effectiveness studies. Little research has been completed on costs, benefits, or effectiveness of alcoholism treatment. In particular, although reimbursement issues are problematic, research in the field of addiction that addresses epidemiology and economic factors is not adequate. It is concluded that there is a need to determine the costs of various treatment strategies, to evaluate the cost-effectiveness relationships of treatment outcomes, and to direct future policy, so that treatment reimbursement is more rational and cost effective.

**Worner, T. M., Chen, P., Ma, S., Xu, S., & McCarthy, E. G. (1993). An analysis of substance abuse patterns, medical expenses and effectiveness of treatment in the workplace: Long-term followup. *Employee Benefits Journal*, 15(5), 15-19.**

This study of workplace substance abuse programs indicates that they are effective for many participants and also shows that these programs can significantly lower medical expenses for those who successfully complete them.

**Yu, J., Chen, P., Harshman, E. J., & McCarthy, E. G. (1991). An analysis of substance abuse patterns, medical expenses and effectiveness of treatment in the workplace. *Employee Benefits Journal*, 16(3), 26-30.**

This article examines the effectiveness of substance abuse treatment offered by the Members Assistance Program of a self-insured union welfare fund. The authors find that medical costs decreased dramatically for participants who were under treatment for at least one year.

**Zaric, G. S., Barnett, P. G., & Brandeau, M. L. (2000). HIV transmission and the cost-effectiveness of methadone maintenance. *American Journal of Public Health*, 90(7), 1100-1111.**

This study determined the cost-effectiveness of expanding methadone maintenance treatment for heroin addiction, particularly its effect on the HIV epidemic. The authors developed a dynamic epidemic model to study the effects of increased methadone maintenance capacity on health-care costs and survival, measured as quality-adjusted life-years (QALYs). They considered communities with HIV prevalence among injection drug users of 5 percent and 40 percent. Additional methadone maintenance capacity costs \$8200 per QALY gained in the high-prevalence community and \$10,900 per QALY gained in the low-prevalence community. More than half of the benefits are gained by individuals who do not inject drugs. Even if the benefits realized by treated and untreated injection drug users are ignored, methadone maintenance expansion costs between \$14,100 and \$15,200 per QALY gained. Additional capacity remains cost-effective, even

if it is twice as expensive and half as effective as current methadone maintenance slots. The authors conclude that expansion of methadone maintenance is cost-effective on the basis of commonly accepted criteria for medical interventions. Barriers to methadone maintenance deny injection drug users access to a cost-effective intervention that generates significant health benefits for the general population.

**Zarkin, G. A., French, M. T., Anderson, D. W., & Bradley, C. J. (1994). Conceptual framework for the economic evaluation of substance abuse interventions. *Evaluation and Program Planning*, 17(4), 409-418.**

Substance abuse treatment directors and policymakers often must allocate limited budgets among several alternative substance abuse treatment programs. Decision makers can gain insight on these difficult budgeting decisions by using economic evaluation techniques. To aid in the economic evaluation, a conceptual framework based on a decision-tree model was developed. The framework describes substance abuse addiction and treatment dynamics and highlights important therapeutic and economic endpoints. Within this framework, the authors describe how cost-effectiveness and benefit-cost analyses can be used to compare the costs and outcomes of alternative substance abuse intervention programs. Implementation of the conceptual framework requires detailed information on the parameters of the substance abuse addiction and treatment process that does not yet exist. But the paper includes a detailed example of how the conceptual framework can be used to perform economic evaluation of alternative substance abuse intervention programs. The paper demonstrates how economic evaluation can be used in conjunction with a decision-tree model to provide researchers and policymakers with the tools to make informed decisions about the allocation of scarce resources.

**Zywiak, W. H., Hoffmann, N. G., Stout, R. L., Hagberg, S., Floyd, A. S., & DeHart, S. S. (1999). Substance abuse treatment cost offsets vary with gender, age, and abstinence likelihood. *Journal of Health Care Finance*, 26(1), 33-39.**

The cost-offset effect has been promoted as a way for substance abuse treatment to pay for itself by generating reductions in health-care utilization in other areas. Clients (n = 5,434) that were abstinent for 24 months following substance abuse treatment had lower post-treatment utilization than clients who had relapsed. An examination of cost offsets revealed a complex interplay between gender, age, and type of utilization (medical versus psychiatric). Cost offsets were especially pronounced for women over 40 years old.